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Nonpharmacologic Interventions for Agitation and Aggression in Dementia

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-based Practice Centers (EPCs), sponsors the development of systematic reviews to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. These reviews provide comprehensive, science-based information on common, costly medical conditions, and new health care technologies and strategies.

Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strength and limits of evidence from research studies about the effectiveness and safety of a clinical intervention. In the context of developing recommendations for practice, systematic reviews can help clarify whether assertions about the value of the intervention are based on strong evidence from clinical studies. For more information about AHRQ EPC systematic reviews, see www.effectivehealthcare.ahrq.gov/reference/purpose.cfm.

AHRQ expects that these systematic reviews will be helpful to health plans, providers, purchasers, government programs, and the health care system as a whole. Transparency and stakeholder input are essential to the Effective Health Care Program. Please visit the Web site (www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an e-mail list to learn about new program products and opportunities for input.

We welcome comments on this systematic review. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to epc@ahrq.hhs.gov.

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Nonpharmacologic Interventions for Agitation and Aggression in Dementia

Structured Abstract

Objective. To assess the efficacy, comparative effectiveness, and adverse effects of nonpharmacologic interventions for agitation and aggression in individuals with dementia.

Data sources. Ovid MEDLINE®, Ovid Embase®, and the Cochrane Central Register of Controlled Trials bibliographic databases; hand searches of references of relevant studies.

Review methods. Two investigators screened abstracts and full-text articles of identified references for eligibility. Eligible studies included randomized controlled trials evaluating nonpharmacologic interventions to manage agitation/aggression in individuals with dementia in nursing homes, assisted living, or community settings. We analyzed outcomes of agitation/aggression, general behavior, patient quality of life, admission to long term care, and staff and caregiver outcomes related to patient behavior and care burden. We assessed risk of bias, extracted data, and evaluated strength of evidence for each comparison and outcome. We analyzed pooled estimates to assess efficacy and comparative effectiveness. We conducted a qualitative analysis when data could not be pooled.

Results. We identified 99 unique randomized controlled trials as of September 2014. Patient-level interventions involving music, aromatherapy with lavender, and bright light were similar to usual treatment or attention control at managing agitation/aggression in dementia patients (low strength evidence); Interventions tailored to recipients' skills, interests, or both were similar in managing agitation/aggression in dementia patients (low strength evidence). Care delivery-level interventions (dementia care mapping and person-centered care) were similar to usual care in managing agitation/aggression in patients with dementia (low strength evidence). Evidence was insufficient to draw conclusions on the effectiveness of caregiver-level interventions (tailored caregiver education and training with caregiver psychosocial support) in managing agitation/aggression in patients with dementia. However, these interventions show benefits in caregiver confidence in caregiving and caregiver burden. Adverse effects were rarely reported.

Conclusions. A large number of trials have been conducted to determine effective nonpharmacologic intervention for agitation/aggression in dementia. The multitude and variety of comparisons provided a weaker evidence base than is needed for such a critical topic. When evidence was sufficient to draw conclusions about effectiveness for a group of interventions, agitation/aggression outcomes were typically similar to controls. Future research is needed to guide providers and informal caregivers towards effective interventions to replace the use of antipsychotics for agitation/aggression in dementia.

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Background

Dementia and Agitation and Aggression

The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), categorizes individuals with acquired cognitive deficits as having neurocognitive disorders.[1] These include subtypes of neurocognitive disorder such as Alzheimer's disease, frontotemporal neurocognitive disorder, neurocognitive disorder with Lewy bodies, and vascular neurocognitive disorder. Because these neurocognitive disorders have historically been labeled dementia, we have used that far more familiar term (rather than neurocognitive disorder) throughout this report.

Up to 90 percent of individuals with dementia exhibit behavioral or psychological symptoms at some point, usually in advanced disease stages.[2] Symptoms tend to cluster and can include depression, psychosis, aggression, agitation, anxiety, and wandering.[2-4] Agitation and aggression are among the most challenging behaviors. Aggression may be more serious than agitation because it can cause harm to the patient and others. Agitation/aggression in individuals with dementia is associated with the use of antipsychotics (and resulting side effects) as well as institutionalization among community-dwelling patients, social isolation, and other negative outcomes. [8] These behaviors challenge formal and informal caregivers and contribute to caregiver anger, resentment toward the patient, stress, and decreased psychological health.[5-7]

Terminology about agitation/aggression is confusing.[13] Both terms are used to describe many behaviors. Many other adjectives are applied to agitated and aggressive behaviors (disruptive, problem, difficult, and challenging). Agitation is defined as "excessive motor activity with a feeling of inner tension and characterized by a cluster of related symptoms including anxiety and irritability, motor restlessness and abnormal vocalization, often associated with behaviors such as pacing, wandering, aggression, shouting, and nighttime disturbance."[14] Aggression is commonly described to be a subtype of agitation[15] consisting of intentional, overt harmful actions (physical or verbal) toward others.[14] We refer to these symptoms as agitation/aggression for the remainder of this report.

Antipsychotic medications are often used to treat agitation/aggression in individuals with dementia. This was more common in the past but still occurs today despite current clinical guidance recommending nonpharmacologic interventions as the first choice for agitation/aggression in dementia.[16-19] Antipsychotic medications have limited efficacy and high risk for adverse effects including stroke and mortality.[9-11] These treatments are also associated with reduced quality of life among individuals with dementia.[12] Reducing unnecessary use of antipsychotics for behavioral symptoms in individuals with dementia is important. Changing practice to nonpharmacologic interventions has been slow. In part this is because clinicians lack knowledge about the efficacy and possible risks of nonpharmacologic interventions. Caregivers are also reluctant to forsake drugs until they are confident about managing agitation/aggression without them.

Nonpharmacologic interventions aim to (1) prevent agitation/aggression, (2) respond to episodes of agitated and aggressive behaviors to reduce their severity and duration, and/or (3) reduce caregiver distress. Individuals with dementia typically reside in nursing homes or assisted-living facilities or at home in their community (community-dwelling).

Interventions delivered in nursing homes and assisted-living facilities can be at the patient level, where a therapy is delivered directly to the patient, or the care-delivery level, involving the approach, staff, and/or environment used in care delivery. Examples of patient-level interventions used in residential settings include sensory-based approaches such as aroma, bright light, or touch, as well as activity-based approaches involving music, art, or horticulture.[21] Care-delivery level interventions include a variety of care delivery models, staff/caregiver education and training, and environmental approaches.[20] Examples include trainings to enhance staff knowledge and skills in managing behavioral symptoms among residents, care delivery models such as patient-centered care or dementia care mapping, and enhancements to the environment aimed at reducing exposure to agitation/aggression-inducing elements.

Interventions delivered to community-dwelling individuals with dementia can be at the patient or caregiver level. The caregiver is typically an informal family caregiver. Patient-level interventions would be similar to those in residential settings. However, patient-level interventions may also include activities, such as exercise classes, that are accessible to individuals in less advanced stages of dementia. Caregiver-level interventions to address agitation/aggression address the family caregiver approach to caregiving. These interventions provide education and skills training to enhance understanding of the disease process, specific symptoms, and how to best address agitation/aggression. Table A provides a classification scheme and examples of the types of interventions used in various settings.

Desired outcomes of nonpharmacologic interventions include a reduction in the incidence and severity of agitation and aggression. Measuring these outcomes is complex. A wide variety of instruments are available. Available instruments are 1) based on different theoretical frameworks, 2) designed to evaluate behaviors in different settings (e.g., home or nursing homes), 3) intended to be administered by different individuals (e.g., caregiver, nurse, or patient), and 4) rely on a variety of mechanisms to obtain responses (e.g., interviews with patients or direct observation). More than 45 specific instruments are used to evaluate behavioral symptoms in dementia. The appropriate instrument depends on disease severity and context of care (e.g., setting, severity of disease, and whether the purpose is to identify any or specific behaviors).[23] Instruments that specifically measure agitation/aggression include the Agitated Behavior in Dementia Scale (ABID),[24] the Cohen-Mansfield Agitation Inventory (CMAI),[25] and the Pittsburgh Agitation Scale (PAS).[26] Additionally, some general behavioral symptom instruments include subscales specific to agitation/aggression.

Evidence synthesis on the efficacy and comparative effectiveness of nonpharmacologic interventions for addressing agitated and aggressive behaviors in patients with dementia is direly needed. This evidence could inform decisionmakers about the best ways to reduce the frequency and severity of those behaviors. Actions inspired by the evidence synthesis could improve functioning, reduce distress, and reduce or delay nursing home admission for individuals with dementia while reducing the use of antipsychotic drugs.

Table A. Types of interventions addressing agitation/aggression in dementia

Setting: ***Intervention Level***	**Intervention Type**	**Examples**
Nursing Homes and Assisted Living Facilities: ***Patient-level***	Sensory	Music therapy (listening), aromatherapy, bright light therapy, multisensory stimulation.
	Structured Activities	Dancing, exercise, social interaction, music therapy (playing, singing), art therapy, outdoor walks
	Complementary and Alternative Medicine	Aromatherapy, reflexology, acupuncture, acupressure, massage, Reki
	Psychological	Validation therapy, reality orientation, reminiscence therapy, support groups
Nursing Homes and Assisted Living Facilities: ***Care-delivery level***	Care Delivery Models	Dementia care mapping; patient centered care
	Staff Training and Education	Specific curricula for communication, managing behaviors
	Environmental	Walled in areas, wandering areas, wayfinding enhancement, reduced stimulation areas, enhanced environments
Community-dwelling: ***Patient-level***	Same as patient-level above	Same as patient-level above
Community-dwelling: ***Caregiver-level***	Caregiver education	Specific curricula to educate caregivers about dementia.
	Caregiver education and training	Specific curricula to educate caregivers about dementia and build skills to manage behaviors.
	Caregiver education and training with psychosocial support	Specific curricula to educate caregivers about dementia and build skills to manage behaviors with additional components such as support groups or counseling.

Scope and Key Questions

This systematic review assesses the efficacy and comparative effectiveness of nonpharmacologic interventions on agitation/aggression in dementia. While the reduction of agitation/aggression is our primary outcome, other outcomes (intermediate and secondary) related to these interventions are important. Intermediate outcomes include immediate changes fostered by the intervention, such as the reduction in antipsychotic medications or improvements in caregiver confidence in caregiving. If interventions are effective and agitation/aggression reduced, this reduced agitation/aggression should lead to improvements in secondary outcomes of burden of care or staff/caregiver distress. Our review addresses these Key Questions based upon an analytical framework (Figure A):

Key Questions

Question 1a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia who reside in nursing home and assisted living settings?

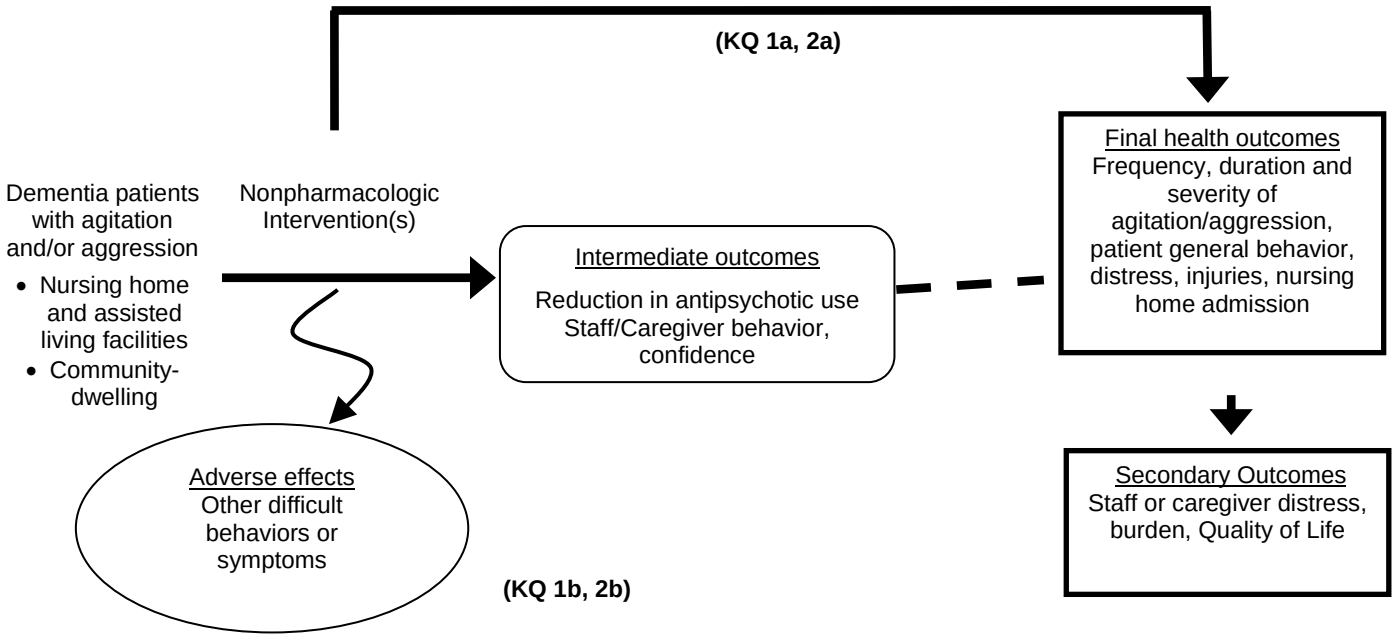
Question 1b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia who reside in nursing home and assisted living settings?

Question 2a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?

Question 2b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?

Analytical Framework

Figure A. Analytic framework for nonpharmacologic interventions to manage agitation/ggression in dementia



PICOTS

The PICOTS (population, intervention, comparison, outcomes, timing, and setting) addressed in this review are described in Table B.

Table B. PICOTS

PICOTS Element	Description
Population(s)	KQ1: Individuals with dementia residing in nursing home and assisted living settings; nursing home and assisted living facility staff KQ2: Community-dwelling individuals with dementia; Informal caregivers of individuals with dementia
Interventions	Nonpharmacologic interventions aimed at preventing or responding to agitation/aggression.
Comparators	Usual care (as specified by trial investigators) or no treatment Attention control or placebo (as specified by trial investigators) Other nonpharmacologic interventions Pharmacologic interventions
Outcomes	**Final (Patient) Health Outcomes** KQ1 & KQ2: Frequency, duration, and severity of agitation/aggression; Frequency, duration and severity of aggressive behaviors; General behavior of person with dementia; Distress; Quality of life; injuries to patients, staff, others KQ2: Injuries to patients, caregivers; admission to nursing home **Secondary Outcomes** KQ1: Staff distress, burden, quality of life KQ2: Caregiver distress, burden, quality of life **Intermediate Outcomes** KQ1: Staff behavior change, reduction in antipsychotic use KQ2: Caregiver behavior change, reduction in antipsychotic use **Adverse Effects of Intervention(s)** Increase in other difficult behaviors (i.e., wandering) Increase in other symptoms (i.e., depression, anxiety)
Timing	Any duration of followup. Relevant timing will vary with the nature of the intervention
Setting	KQ1: Nursing homes and assisted living facilities KQ2: Community-dwelling (patients living at home)

Methods

Inclusion Criteria

Studies were included based on the PICOTS framework outlined above, and the study-specific inclusion criteria described in Table C. We chose to include only RCTs given the necessity of an adequate comparison group to assess subjective outcomes. Selection bias in cohort studies would limit believability of the results.

Table C. Study inclusion criteria

Category	Criteria for Inclusion
Study Enrollment	Trials that enroll one of the following: • Residents of nursing home, assisted living, individuals diagnosed with dementia (any type) with agitation/aggression • Long-term care staff caring for individuals with dementia and associated agitation/aggression • Community-dwelling individuals diagnosed with dementia (any type) with agitation/aggression • Caregivers of community-dwelling individuals with dementia and associated agitation/aggression
Study Objective	Nonpharmacologic intervention aiming to prevent and/or decrease agitation and aggression associated with dementia
Study Design	Randomized controlled trials
Time of Publication	Literature published from 1994 forward (reflects interventions used today)
Publication Type	Published in peer reviewed journals
Language of Publication	English

Literature Search Strategy

We searched Ovid Medline®, Ovid Embase®, and the Cochrane Central Register of Controlled Trials (CENTRAL) to identify randomized controlled trials (RCTs). Our search strategy included relevant medical subject headings and natural language terms for concepts of dementia and behavioral symptoms. These concepts were combined with filters to select RCTs. We screened bibliographic database search results for studies relevant to our PICOTS framework and study-specific criteria. Titles and abstracts were reviewed independently by two investigators to identify trials meeting PICOTS framework and inclusion/exclusion criteria. Titles and abstracts identified as potentially eligible by either investigator underwent full-text screening. Two investigators determined eligibility on full-text review, consulting with a third investigator as necessary to resolve differences. We documented the exclusion status of articles undergoing full-text screening.

We searched Clinicaltrials.gov and Embase (publication type: conference abstracts, proceedings) for gray literature to assess reporting bias. Trials registration for nonpharmacologic interventions appears to be infrequent. Search results were primarily for pharmacologic interventions making an assessment of publication bias for the intervention studied in this review limited.

Data Abstraction and Management

RCTs meeting inclusion criteria were distributed among investigators for risk of bias assessment. Data was extracted by one investigator for trials of low or moderate risk of bias. Data fields extracted included author, year of publication, geographic location, intervention, and control characteristics (intervention components, timing, frequency, and duration). High risk of

bias trials were excluded from the analysis in effort to report the best available evidence. Relevant data were extracted into evidence tables. While agitation/aggression is our primary outcome, we did extract data for other measures of behavior or behavioral symptoms because many trials used these more general instruments instead of instruments designed specifically to assess agitation/ aggression. These data will be verified and uploaded into the Systematic Review Data Repository after completion of final report.[27]

Risk of Bias Assessment of Individual Trials

Two investigators independently assessed risk of bias of eligible trials using instruments developed for the project based upon AHRQ guidance.[28] Overall summary risk of bias assessments for each study were classified as low, moderate, or high based on the collective risk of bias inherent in each domain and confidence that the results are believable given the study's limitations. Investigators conferred to reconcile discrepancies in overall risk of bias assessments when one investigator assessed the study as high risk of bias. In certain situations, a third party was consulted to reconcile the summary judgment.

Data Synthesis

We summarized the results in detailed tables for each unique population and intervention type. We searched for but did not find established minimum important differences for key outcomes measurement instruments in the literature. We primarily synthesized results across conceptually similar comparisons and outcomes using qualitative synthesis. When comparisons could be reasonably pooled (i.e., comparable patient/caregiver populations, interventions, and outcomes), we meta-analyzed the data using a Knapp-Hartung random effects model in Stata.[29] We calculated risk ratios (RR), absolute risk differences (RD) or both with the corresponding 95% CIs for binary primary outcomes. We calculated weighted mean differences (WMD) and/or standardized mean differences (SMD) with the corresponding 95% CIs for continuous outcomes. We assessed the clinical and methodological heterogeneity and variation in effect size to determine appropriateness of pooling data.[30] We assessed the magnitude of statistical heterogeneity with the I^2 statistic.[30]

Strength of the Body of Evidence

The overall strength of evidence for primary outcomes within each patient/caregiver population, intervention comparison, and outcome combination was evaluated based on five domains: 1) study limitations (risk of bias); 2) directness (single, direct link between intervention and outcome); 3) consistency (similarity of effect direction and size); and 4) precision (degree of certainty around an estimate), and 5) reporting bias.[31] Based on risk of bias of the individual trials within the comparison, study limitations were rated as low, medium, or high. Consistency was rated consistent, inconsistent, or unknown/not applicable (e.g., single study) based on whether intervention effects were similar in direction and magnitude, and the statistical significance of all trials. Directness was rated direct or indirect based on whether the outcome was a final patient-centered outcome or an intermediate or secondary outcome. Precision was rated precise or imprecise based on the degree of certainty surrounding each effect estimate or qualitative finding. Imprecise estimates include clinically distinct conclusions within the confidence interval. Reporting bias was evaluated by the potential for publication bias by comparing trials identified and considered potentially eligible from gray literature searches with

identified published trials. This was limited due to the infrequent registration for these types of trials. Other factors considered in assessing strength of evidence included dose-response relationship, the presence of confounders, and strength of association.

Based on these factors, the overall strength of evidence for each outcome was assessed:[31]

High: Very confident that estimate of effect lies close to true effect. Few or no deficiencies in body of evidence, findings believed to be stable.

Moderate: Moderately confident that estimate of effect lies close to true effect. Some deficiencies in body of evidence; findings likely stable, but some doubt remains.

Low: Limited confidence that estimate of effect lies close to true effect; major or numerous deficiencies in body of evidence. Additional evidence is necessary before concluding that findings are stable or that estimate of effect is close to true effect.

Insufficient: No evidence, unable to estimate an effect, or no confidence in estimate of effect. No evidence is available or the body of evidence precludes judgment.

Applicability

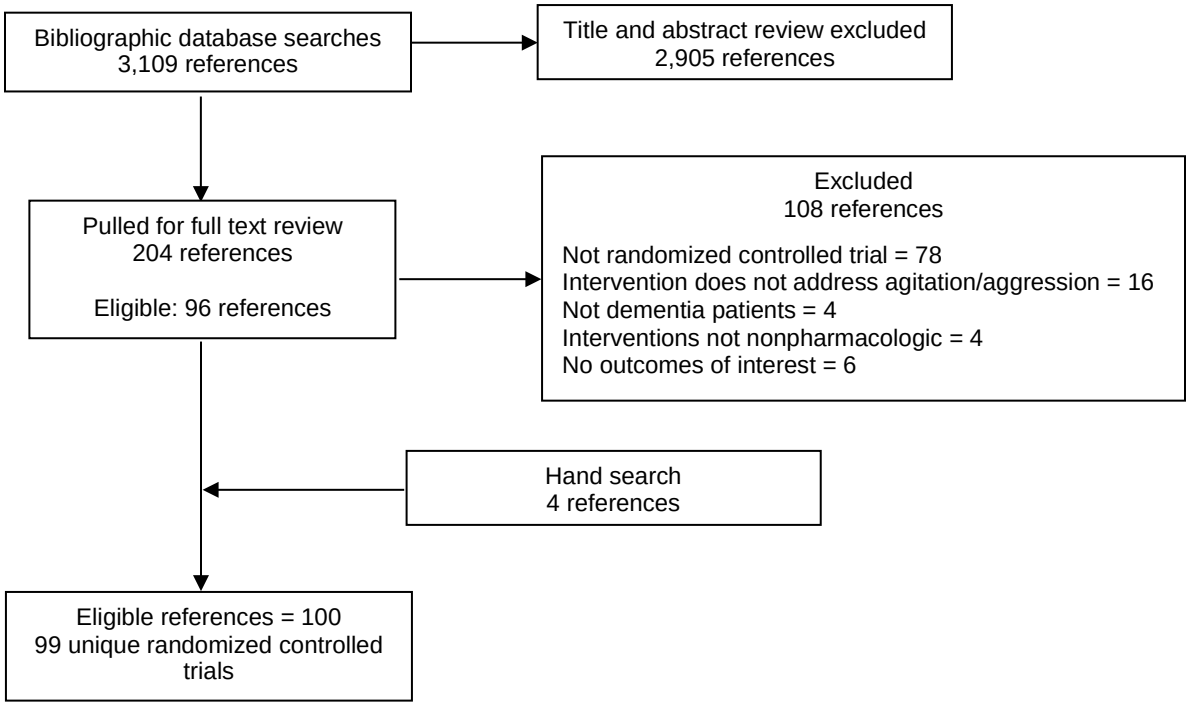
Applicability of trials was determined according to the PICOTS framework. Study characteristics affecting applicability included the population from which the trial participants are enrolled, diagnostic assessment processes, narrow eligibility criteria, and patient and intervention characteristics different than those described by population trials of behavioral symptoms in dementia.[32]

Results

Results of Literature Search

Our search identified 3,109 unique records, of which 204 required full-text review after title and abstract screening (Figure B). We completed full-text review and hand searched key systematic reviews to identify 100 eligible articles representing 99 unique trials.

Figure B. Literature flow diagram



We divided the 99 unique and mutually exclusive trials into four categories for analysis based upon the setting in which the interventions occurred:

- Patient-level intervention delivered in nursing home and assisted living facility settings (total eligible=54)
- Care delivery-level interventions delivered in nursing home and assisted living facility settings (n=23)
- Patient-level interventions delivered to community-dwelling individuals with dementia (n=3)
- Caregiver-level interventions delivered to caregivers of community-dwelling individuals with dementia (n=20; 19 unique RCTs)

Patient-Level Interventions in Nursing Homes and Assisted Living Facilities

Of the 54 eligible trials that fit into this category, 22 were assessed as having a high risk of bias. Our analysis of the remaining 32 trials is organized below by intervention type. Table D provides summary results and strength of evidence.

Key Points

- Low strength evidence shows that music interventions, aromatherapy with lavender, and bright light therapy are similar to no intervention, placebo, and/or attention control in decreasing agitation/aggression among nursing home and assisted living facility residents with dementia.
- Low strength evidence shows that interventions tailored to patient skills, interventions tailored to patient interests, and interventions delivered to both skills and interests have similar effects on agitation/aggression among nursing home and assisted living facility residents with dementia.
- Evidence was insufficient for all other outcomes and comparisons.

Music Interventions

Four trials with low or medium risk of bias examined the efficacy of music interventions for agitation/aggression in nursing home and assisted living facility settings.[33-36] Trials were conducted in Italy, Japan, Taiwan, and the United States. Inclusion criteria varied; most trials required behavioral symptoms as well as a diagnosis of dementia. In two trials the music interventions were delivered to groups of residents[34,35] and in the other two the interventions were individualized.[33,36] Comparison groups received usual care, no treatment, or attention control. Music intervention sessions varied in length (10 to 30 minutes), frequency (one time, weekly, three times per week) and duration (one time to 6 months). Type and number of staff involved in the intervention also varied. Trials assessing the efficacy of music interventions enrolled a total of 233 nursing home residents.[33-36] Remington et al. differed notably from the three other music intervention trials in that it measured effects immediately and within 30 minutes of the intervention; the remaining trials evaluated the longer-term effect of music therapy by measuring outcomes at a variety of time points during several weeks.

Remington et al. showed a benefit for the music intervention for agitation/aggression. The other three trials failed to show a statistically significant improvement over usual care, no treatment, or attention control. Pooled results from two of these trials showed similar effects with

music and control. Evidence was insufficient to conclude whether music interventions reduce agitation/aggression immediately after participation. Low strength evidence shows that music interventions are similar to usual care, no treatment, or attention control in decreasing agitation/aggression in individuals with dementia.

Four trials enrolling a total of 218 nursing home residents with dementia and behavioral symptoms compared music interventions with other therapies.[33,36-38] None showed a difference between music interventions and any other active intervention (including other music interventions, interactive reading, recreational activities, and hand massage) on agitation/aggression. Low strength evidence suggests that music interventions are similar to active comparisons at decreasing agitation/aggression in dementia. One of these trials (n=26) also reported a general behavior outcome.[33] Music interventions and active comparisons had similar effects on general behavior outcomes. Evidence was insufficient to assess the comparative effectiveness of music interventions versus other active interventions on general behavior.

Aromatherapy

Aromatherapy interventions involve inhalation or topical application of scented essential oils, such as lavender. Efficacy trials often used placebo aromas or sprays such as sunflower oil. We identified four trials with acceptable risk of bias that assessed the efficacy of aromatherapy in nursing home residents with agitation/aggression.[39-42] The trials enrolled a total of 215 nursing home residents and were conducted in nursing homes in Australia, Japan, Hong Kong, and the United Kingdom. Three trials studied lavender[40-42] and one studied Melissa oil.[39] Treatments ranged in frequency and method of delivery. Aromatherapy was delivered via drops on clothing, diffused in the air, or applied as lotion. Frequency of aromatherapy ranged from two to three times a day for durations of 3 to 6 weeks.

Only in one trial (n=72) did aromatherapy improve agitation/aggression compared with placebo.[39] This trial used a different scent (Melissa) than the other three trials (lavender). The Melissa scent as lotion was also applied to the patient by a staff member, whereas the other trials delivered aromatherapy without touch, except for one trial arm that combined hand massage with aromatherapy. Low strength evidence shows that aromatherapy with lavender is similar to placebo in managing agitation/aggression in dementia. Evidence regarding the effectiveness of Melissa in managing agitation/aggression in dementia is insufficient to draw conclusions. Evidence for all other outcomes and harms was insufficient.

Bright Light Therapy

Light therapy interventions included some variant of bright light therapy. Four trials that studied the efficacy of light therapy had acceptable risk of bias.[43-46] Interventions involved exposure to bright light, defined variably as 2,500 lux, greater than 2,500 lux, and 10,000 lux. Comparison groups received exposure to standard light (100 to 250 lux), dim red light, or no treatment. Bright light therapy sessions were typically 1 to 2 hours per day at varying times of day. Treatment durations ranged from 10 days to 10 weeks.

Bright light efficacy trials enrolled a total of 225 nursing home residents. Two trials provided data on agitation/aggression measured with the CMAI sufficient for pooling. The pooled standardized mean difference in agitation/aggression for these two trials was 0.09 (95% CI: -0.32 to 0.50). Low strength evidence shows that bright light therapy is similar to standard light in

managing agitation/aggression in dementia. Evidence was insufficient for other outcomes and harms.

Therapeutic Touch (or Noncontact Therapeutic Touch)

Therapeutic touch refers to transfers of energy without necessarily using physical touch. Typically, a practitioner sits next to the patient and places his or her hands on or near the patient to transfer energy. Two trials with acceptable risk of bias examined therapeutic touch.[47,48] These trials enrolled a total of 108 nursing home residents. Treatments were delivered once a day in 30 to 40 minute sessions for 5 days in one trial and twice daily for 5 to 7 minute sessions for 3 days. Interventions were delivered by trained professionals. Comparison groups received simulated therapeutic touch. Only one trial reported agitation/aggression and found no differences between intervention and inactive control. Both trials reported general behavior measures, with evidence of a positive effect on one and mixed results in the other. Evidence was insufficient to draw conclusions regarding the effectiveness of therapeutic touch for agitation/aggression or general behavior in dementia. Evidence for all other outcomes and adverse effects was insufficient.

Massage

Two trials of acceptable risk of bias tested the efficacy of massage for agitation/aggression in dementia. The first trial compared hand massage with no treatment in two of three arms.[36] The other compared back and lower limbs massage by physiotherapists for 20 minutes daily with no treatment in two of three arms.[49] Relevant arms of these trials comprised 105 nursing home residents.

One of the two trials reported an agitation/aggression outcome;[36] the other, a general behavior outcome.[49] Agitation/aggression was reduced immediately following hand massage compared with no treatment. Trials had methodological limitations and estimates were imprecise. Evidence is insufficient to draw conclusions about the effect of massage on agitation/aggression or general behavior among nursing home residents with dementia.

Tailored versus Nontailored Interventions

We identified three trials with acceptable risk of bias comparing tailored interventions to nontailored interventions.[50-52] Trials enrolled a total of 247 nursing home residents. The interventions used various resident characteristics for tailoring. One tailored the intervention based on an assessment for unmet needs,[50] another on the Montessori model,[52] and the third on balancing arousal throughout the day according to the patients' response to different activities.[51] Delivery of the interventions varied.

Only the trial tailoring interventions to unmet needs found a decrease in the level of agitation/aggression with tailored activities compared with nontailored activities.[50] All three trials had methodological limitations and imprecise estimates. Evidence was insufficient to draw conclusions regarding the effectiveness of tailored activities compared with nontailored activities.

Different Tailored Activity Interventions

Two trials enrolling 158 nursing home residents compared interventions tailored with different resident characteristics. The first tested the Needs-Driven, Dementia-Compromised Behavior model. This model posits that activities for individuals with behavioral symptoms must fit the physical and cognitive functional abilities and personality of the resident.[53,54] It was tested

in two different trials with multiple arms: groups that received activities appropriate to their abilities but opposite to their personalities; a group that received activities appropriate to their personalities but opposite to their abilities; and a group that received activities appropriate to both.

Evidence was insufficient to draw conclusions about the comparative effectiveness of interventions tailored to different patient characteristics.

Unique Comparisons

The efficacy and/or comparative effectiveness of several other nonpharmacologic interventions was in single trials. These interventions included ear acupuncture, acupressure, massage versus ear acupuncture, structured activities, structured activities versus ear acupuncture, reminiscence, group exercise, pleasant experiences, multisensory stimulation versus recreational activities, an activities of daily living intervention, simulated presence, an intervention aiming to enhance family visits, electrostimulation, and a multisensory stimulation intervention.[55] All trials were relatively small with methodological limitations. Most comparisons had similar effects. Evidence was insufficient to conclude whether any intervention offered a benefit in managing agitation/aggression in dementia or in effecting all other outcomes and adverse effects.

Table D. Patient-level interventions for agitation/aggression in nursing home and assisted living facility residents with dementia

Intervention-Comparison	Total Number of Trials (Number of Participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Music vs. no treatment/attention control (for sustained reduction in agitation/aggression)	3 (199)	Low – agitation/aggression not improved
Music vs. no treatment/attention control (for immediate reduction in agitation/aggression)	1 (34)	Insufficient – no conclusions drawn
Music vs. Comparison Intervention (for sustained reduction in agitation/aggression)	4 (218)	Low – agitation/aggression not improved
Aroma therapy with Lavender vs. no treatment/attention control	2 (115)	Low – agitation/aggression not improved
Aroma therapy with Melissa vs. no treatment/attention control	1 (72)	Insufficient – no conclusions drawn
Light Therapy vs. no treatment/attention control	4 (225)	Low – agitation/aggression not improved
Therapeutic Touch vs. no treatment/attention control	1 (51)	Insufficient – no conclusions drawn
Massage vs. no treatment/attention control	1 (34)	Insufficient – no conclusions drawn
Tailored Activities vs. Nontailored Activities	3 (247)	Insufficient – no conclusions drawn
Tailored Activities vs. Tailored Activities	2 (158)	Low – agitation/aggression not improved
General Behavior		
Music vs. no treatment/attention control (for sustained reduction in agitation/aggression)	2 (99)	Insufficient – no conclusions drawn
Music vs. Comparison Intervention (for sustained reduction in agitation/aggression)	1 (26)	Insufficient – no conclusions drawn
Aroma therapy with Lavender vs. no treatment/attention control	2 (98)	Insufficient – no conclusions drawn
Light Therapy vs. no treatment/attention control	3 (133)	Low – general behavior not improved
Therapeutic Touch vs. no treatment/attention control	2 (108)	Insufficient – no conclusions drawn
Massage vs. no treatment/attention control	1 (71)	Insufficient – no conclusions drawn

Care-delivery Level Interventions in Nursing Homes and Assisted Living Facilities

Twenty-three eligible trials assessed care-delivery level interventions for agitation/aggression in residents of nursing homes and assisted living facilities. The 17 trials with acceptable risk of bias examined a wide variety of care-delivery level interventions including dementia care mapping, patient-centered care, emotion-oriented care, various staff trainings, and environmental changes to assist wayfinding. We grouped trials by intervention type and comparison. Trials differed in the unit of randomization (i.e., at nursing-home level, staff, or residents). Table E provides a summary of the results by intervention type and comparison.

Key Points

- Low strength evidence shows that dementia care mapping and person-centered care are similar to usual care in decreasing agitation/aggression among residents with dementia.

Dementia Care Mapping

Dementia care mapping is a systematic approach to identifying and strategically responding to presumed causes of agitation/aggression and distress. The process consists of observing care, the environment, and factors associated with resident wellbeing as identified by behavioral indicators, and then identifying positive and negative aspects of care delivery. Feedback is given to nursing home staff and used to inform action plans. Three trials with acceptable risk of bias evaluated the effectiveness of dementia care mapping in nursing homes using cluster randomized designs.[56-58] These trials enrolled a total of 643 nursing home residents.

All trials assessed agitation/aggression. Only Chenoweth et al. reported an effect in favor of dementia care mapping on the primary measure of agitation/aggression. Rokstad et al. reported mixed results with a significant improvement for dementia care mapping with one instrument but not another. Both statistically significant results were small and unlikely to be clinically meaningful.[56,57] Pooled results for these three trials showed similar effects with dementia care mapping and usual care on agitation/aggression (standardized mean difference: -0.12; 95% CI: -0.66 to 0.42; I^2=53). Low strength evidence showed that dementia care mapping is similar to usual care in managing agitation/aggression in dementia. Evidence for all other outcomes and adverse effects was insufficient.

Person-Centered Care

Person-centered care aims to foster personhood (e.g., positive relationships with others) as dementia progresses. It involves observations and feedback but requires less effort to identify underlying causes of behaviors than dementia care mapping. Three trials evaluated person-centered care using cluster randomized designs.[56,57,59] Trials enrolled a total of 775 nursing home residents.

All trials assessed agitation/aggression. Only Chenoweth et al. reported a statistically significant effect of person-centered care for agitation/aggression. However, because the effect size was unlikely to be clinically meaningful, the statistical difference should not be interpreted as evidence of effectiveness. Rokstad et al. reported a statistically significant reduction in agitation/aggression for person-centered care assessed with one instrument but not another. Pooled results these three trials showed similar effects with person-centered care and usual care on agitation/aggression in dementia (standardized mean difference -0.15; 95% CI: -0.67 to

0.38; I^2=56). Low strength evidence shows that person-centered care and usual care have similar effects on agitation/aggression in dementia. Evidence was insufficient for all other outcomes and for adverse effects. Evidence for general behavior and intermediate outcomes was insufficient.

Protocols to Reduce Use of Antipsychotics

Two trials tested staff training and clinical protocols to reduce the use of antipsychotics.[59,60] Trials enrolled a total of 604 nursing home residents.

Fossey et al. reported a null effect for the intervention. In contrast, Rapp et al. found that the intervention significantly reduced agitation/aggression. Pooled results for these two trials showed similar effects with protocols or usual care on agitation/aggression as measured by the CMAI (mean difference -4.5; 95% CI:-38.84 to 29.93; $I^{2=}$32). Evidence was insufficient to draw conclusions regarding the effect of protocols to reduce agitation/aggression among residents with dementia. The two trials again showed inconsistent results. Pooled results for these two trials showed that protocols had no effect on antipsychotic dose (standardized mean difference -0.28; 95% CI, -3.50 to 2.94). Evidence was also insufficient to draw conclusions regarding efficacy of interventions on other outcomes or adverse effects.

Emotion-Oriented Care

Emotion-oriented care consists of understanding the resident's perception of the environment and the role of verbal and nonverbal communication in the caregiver-patient relationship. Two trials evaluated emotion-oriented care using cluster randomized designs.[61,62] Trials enrolled a total of 297 nursing home residents.

Neither trial showed an effect for emotion-oriented care on agitation/aggression.[61,62] Evidence was insufficient to assess the efficacy of emotion-oriented care for managing agitation/aggression in dementia.

Unique Comparisons

Several trials examined unique interventions including staff education and training for dementia, staff training versus psychosocial management of behavioral symptoms, staff training regarding resident awareness, educating occupational therapists to identify patient preference, protocol to enhance resident comfort, staff training on nonverbal sensitivity, a nursing assistant communication skills program, an intervention to improve interactions between care staff, the environment, and residents, advanced illness care teams, and a wayfinding intervention.[55] These trials typically had small sample sizes and methodological problems; thus, evidence was insufficient for all comparisons and outcomes.

Table E. Care-delivery level interventions for agitation/aggression in nursing home and assisted living facility residents with dementia

Intervention-Comparison	Total Number of Trials (Number of Participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Dementia Care Mapping	3 (643)	Low – agitation/aggression not improved
Person Centered Care	3 (813)	Low – agitation/aggression not improved
Protocols to reduce Neuroleptic Use	2 (604)	Insufficient – no conclusions drawn
Emotion Oriented Care	2 (297)	Insufficient – no conclusions drawn
General Behavior		
Dementia Care Mapping	3 (643)	Insufficient – no conclusions drawn
Person Centered Care	2 (467)	Insufficient – no conclusions drawn
Intermediate Outcomes		
Dementia Care Mapping	1 (180)	Insufficient – no conclusions drawn (staff behavior)
	1 (158)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Person Centered Care	2 (505)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Protocols to reduce Neuroleptic Use	2 (604)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Emotion Oriented Care	1 (151)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Secondary Outcomes		
Dementia Care Mapping	1 (159)	Insufficient – no conclusions drawn (injuries)
	1 (180)	Insufficient – no conclusions drawn (staff distress/burden/quality of life)
Person Centered Care	1 (159)	Insufficient – no conclusions drawn (injuries)
Emotion Oriented Care	1 (146)	Insufficient – no conclusions drawn (staff distress/burden/quality of life)

Patient-Level Interventions for Community-Dwelling Individuals With Dementia

We identified three unique RCTs of patient-level interventions for agitation/aggression in community-dwelling individuals with dementia.[63-65] Two were assessed as having high risk of bias and were not included in the analysis.[64,65] Table F summarizes these results.

Key Points

- Evidence on patient-level interventions for agitation/aggression in dementia is extremely limited.

Multisensory Stimulation Versus Active Control

Baker et al. randomized 50 community-dwelling individuals with dementia to a multisensory stimulation intervention (n=25) or an active control group (n=25).[63] Patient agitation/aggression and general behavior changes were similar with intervention and control after controlling for differences in baseline characteristics. For all outcomes and for adverse effects, this trial provides insufficient evidence for the effectiveness of a patient-level multisensory stimulation intervention for treatment of agitation/aggression in community-dwelling individuals with moderate to severe dementia.

Table F. Patient-level interventions for agitation/aggression in community-dwelling individuals with dementia

Intervention-Comparison	Total Number of Trials (Number of Participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Multisensory vs. activity	1 (50)	Insufficient – no conclusions drawn
General Behavior		
Multisensory vs. activity	1 (50)	Insufficient – no conclusions drawn

Caregiver-Level Interventions for Community-Dwelling Individuals with Dementia

We identified 20 articles reporting on 19 unique RCTs of caregiver-level interventions for agitation/aggression in community-dwelling individuals with dementia. Seven of these trials were assessed as having high risk of bias and were excluded from analysis, resulting in 13 articles of 13 unique trials with an acceptable risk of bias. We categorized trials into three groups: 1) standard education and training in which all participants received the same curriculum, 2) tailored education and training based on assessments of behaviors and/or triggers for those behaviors in the person with dementia, and 3) tailored education and training combined with caregiver psychosocial support (e.g., counseling, social support, cognitive reframing, stress management). We conducted a qualitative analysis because trial interventions and outcomes were heterogeneous and pooling was not appropriate. Table G summarizes the results of these groups.

Key Points

- Evidence was insufficient to conclude whether tailored caregiver education and training combined with psychosocial interventions are effective in managing agitation/aggression in community-dwelling individuals with dementia. Low strength evidence shows that tailored caregiver education and training combined with psychosocial interventions are similar to usual care in changing general behavior in community-dwelling individuals with dementia.
- Low strength evidence shows that tailored caregiver education and training combined with psychosocial interventions improved caregiver confidence or mastery in managing individuals with dementia.
- Low strength evidence shows that tailored caregiver education and training combined with psychosocial interventions improves caregiver burden.
- Evidence was insufficient to draw conclusions about the efficacy of tailored caregiver education and training combined with psychosocial interventions in improving general behavior, patient distress or quality of life, admission to nursing home, and antipsychotic drug use.

Caregiver Education Versus Behavior Management

One eligible trial with acceptable risk of bias evaluated interventions aimed primarily at educating caregivers about dementia and how to address common situations. The only treatment arms relevant to our Key Question were behavior management and haloperidol. These arms enrolled a total of 148 caregiver recipient pairs. The behavior management intervention consisted

of 11 therapist-led sessions (8 weekly and 3 biweekly) over 16 weeks. Agitation/aggression was measured with three instruments: a dichotomous variable measuring improvement based on change in ADCS-CGIC; continuous variables based upon scores on the ABID frequency scale, and the CMAI. General behavior was measured with the BRSD. This trial provided insufficient evidence to conclude comparative effectiveness of caregiver behavioral management versus haloperidol in treating agitation/aggression in community-dwelling individuals with dementia.

Tailored Caregiver Education and Training

Two small trials with acceptable risk of bias compared tailored education and training with waitlist or attention controls; the two trials enrolled a total of 118 patient-caregiver pairs. Effects on all outcomes and adverse effects were similar for intervention and control. However, methodological limitations and lack of precision for all outcomes render this evidence insufficient to draw conclusions regarding these comparisons.

Tailored Caregiver Education and Training With Caregiver Psychosocial Support

Ten eligible trials evaluated interventions that provided education and training (based on an assessment) combined with a psychosocial intervention for caregivers.[66-75] Sample size ranged from 42 to 518. Interventions varied in the number of sessions, duration, specific psychosocial components included, and type of healthcare professional delivering the intervention.

Only two of the 10 trials measured patient agitation/aggression outcomes. Other trials measured general behavior. Of the two trials that measured agitation/aggression, one found significant moderately sized intervention effects and the other found similar effects between intervention and control. Evidence is insufficient to draw conclusions about the effectiveness of tailored education and training with psychosocial support in managing agitation/aggression in community-dwelling individuals with dementia.

Among the eight trials that measured general behavior, the evidence for the effectiveness of these interventions was mixed. However, most suggested similar results with intervention or control. Low strength evidence shows that tailored caregiver education and training with psychosocial support is similar to inactive control in managing general behaviors in dementia.

None of the 10 trials assessed antipsychotic use. Four trials conducted by the same author reported intermediate outcomes related to changes in caregiver behavior, most often mastery or confidence in using activities to manage behavioral symptoms. Of these trials, three found a positive intervention effect; the one that showed no effect was small and perhaps not sufficiently powered to detect small differences between groups. Low strength evidence shows that caregiver tailored education and training combined with a caregiver psychosocial component improves caregiver confidence or mastery in caring for individuals with dementia.

Many studies reported secondary outcomes. Results were mixed within and among trials. Additionally, these interventions educate and train caregivers with psychosocial support as an additional component. Therefore, outcomes of caregiver burden, distress, and quality of life are considered direct outcomes. Low strength evidence shows that these interventions may have a small effect in improving caregiver burden.

Table G. Caregiver-level interventions for agitation/aggression in nursing home and assisted living facility residents with dementia

Intervention-Comparison	Total Number of Trials (Number of Participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Standard Education and Training vs. haloperidol	1 (75)	Insufficient – no conclusions drawn
Tailored Education and Training	1 (75)	Insufficient – no conclusions drawn
Tailored Education and Training with Caregiver Psychosocial Support	2 (265)	Insufficient – no conclusions drawn
General Behavior		
Standard Education and Training vs. haloperidol	1 (75)	Insufficient – no conclusions drawn
Tailored Education and Training	2 (118)	Insufficient – no conclusions drawn
Tailored Education and Training with Caregiver Psychosocial Support	8 (1,896)	Low – general behavior not improved
Intermediate Outcomes		
Tailored Education and Training with Caregiver Psychosocial Support	1 (62)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Standard Education and Training vs. haloperidol	4 (694)	Low (caregiver behavior/confidence improved)
Secondary Outcomes		
Standard Education and Training vs. haloperidol	1 (75)	Insufficient – no conclusions drawn (Caregiver distress/burden/QoL)
Tailored Education and Training	2 (118)	Insufficient – no conclusions drawn (Caregiver distress/burden/QoL)
Tailored Education and Training with Caregiver Psychosocial Support	9 (2,119)	Low (caregiver distress/burden/QoL slightly improved)

Discussion

Key Findings and Strength of Evidence

Reducing reliance on off-label use of antipsychotic drugs for individuals with dementia is a national priority. Evidence is mounting about the risks of drug treatment and the disadvantages to patients living in an overmedicated condition from antipsychotics. Changes in practice will require strong evidence in support of nonpharmacologic treatments that reduce agitation/aggression while improving patient quality of life. Providers and informal caregivers who are confident that nonpharmacologic options are effective will be more willing to forgo antipsychotics.

Unfortunately, despite an urgent need for strong evidence, the current literature is weak. Most trials failed to show a positive effect or found an effect no greater than usual care. We tried to identify patterns within groups of conceptually similar comparisons. Evidence for most interventions was insufficient; in some cases we found low strength evidence of no effect. Low strength evidence shows that patient-level interventions involving music, aromatherapy with lavender, and bright light therapy in nursing home and assisted living settings had effects similar to placebo, attention control, or usual care. Low strength evidence shows that music interventions were similar to other interventions in managing agitation/aggression in dementia over time. Low strength evidence shows that interventions tailored to patient abilities, interests, or both are similarly ineffective in managing agitation/aggression in dementia. Low strength evidence shows that dementia care mapping or person-centered care were similar to usual care in improving agitation/aggression among nursing home and assisted living facility residents with dementia. Low strength evidence shows that tailored caregiver education and training combined with psychosocial support had similar effects on general behaviors in dementia, but improved

caregiver confidence in providing care when compared with controls (waitlist, attention control, usual care). Low strength evidence shows that these caregiver interventions reduce caregiver burden.

Studying the nonpharmacologic management of agitation/aggression in dementia remains a cottage industry. Trials are often small and vary widely in techniques and measures. Few trials examined common combinations of setting, intervention, comparison, and outcome. Given the wide variation in outcomes reported and analyses conducted, pooling for meta-analysis was rarely possible. However, we tried to identify patterns within the clusters of basic approaches.

Our review reflects the limitations of the available literature. We found substantial heterogeneity in interventions and outcomes across trials and methodological problems within trials. While we did identify a large number of trials that tested interventions for improving behavioral symptoms in dementia; fewer specifically measured agitation/aggression. Few groups of studies had sufficient similarity in interventions, comparisons, and outcomes to allow appropriate data pooling. When pooling was not appropriate, we attempted a qualitative synthesis of similar comparisons and outcomes. Despite these attempts, our analysis still consists of several unique comparisons, often from small studies with methodological limitations, resulting in evidence insufficient to draw conclusions about efficacy or comparative effectiveness.

Our primary outcome was agitation/aggression. Several different instruments were used to assess this outcome. Certain instruments are best suited to certain settings and patients. Whether each study selected the most appropriate instrument was unclear, and we found little information regarding changes in these scores associated with a clinically meaningful difference. None of the studies we analyzed used instrument-specific thresholds to assess efficacy or comparative effectiveness. Additionally, although the CMAI is a very widely used instrument in nursing home and assisted living settings and has been determined valid and reliable, many studies reported only subscales of the CMAI. Whether these subscales are valid or reliable or sensitive to changes occurring in response to treatment is unclear.

Understanding that we may not find studies that reported agitation/aggression, we included studies that assessed behavioral symptoms with more general instruments. These instruments (NPI, MOSES) contain items across a wide variety of behavioral symptoms. Changes in overall scores on these instruments are not straightforward or directly related to agitation/aggression.

We found few references documenting established minimal important differences for any of the instruments used to assess agitation/aggression, general behavior, or intermediate and secondary outcomes. Without an understanding of what constitutes a clinically meaningful change, interpretation of statistically significant differences and assessment of precision was challenging.

Individual studies assessed as having a low or moderate risk of bias still presented several methodological problems. Many trials were underpowered. Underpowered studies that cannot be pooled add little value to the field and should not be conducted. Calculating sample sizes necessary for appropriately powered RCTs should incorporate the high attrition rate commonly found in this population of older adults with health problems. Individuals with dementia change living status and die. Withdrawals and dropouts created considerable loss of participants from already small sample sizes in some studies. Although attrition was predictably high in the studies we reviewed, it was not always adequately described and intention to treat analysis was rarely conducted.

Details regarding the population, setting, and methodology were often inadequately described. Few studies provided details on dementia type or severity/stage of illness.

Current study designs are not well described, which is a common problem in nonpharmacologic research.[134] Control conditions are also poorly described, including the concomitant use of

antipsychotic medications. This was especially a problem in older studies. Often, sample selection and method of randomization were not reported. Few studies described and accounted for simultaneous treatments, especially psychoactive medications. When use of psychoactive medications was reported, trials rarely eliminated their use; at most, medications were held constant during the study and/or medication changes were recorded as an outcome. Outcome assessors were often aware of the intervention status of participants or of the research question, potentially biasing the findings. Many studies used multiple outcomes and analyzed multiple comparisons but most failed to make statistical adjustments for the multiple comparisons.

Moreover, usual care was rarely described when it was used as a comparison. People with dementia, especially in group residential settings, are typically exposed to a hodgepodge of activities and therapies designed to improve functioning and quality of life. Indeed, RCTs of one intervention are sometimes used as an attention control for another intervention. Similarly, the physical environments and rules for conduct in the residential settings of the studies are seldom described, yet could have powerful effects on reducing or ameliorating agitation/aggression

Many observers tend to combine aggression and agitation/aggression as an outcome, but these are not synonymous. Although aggression is a form of agitation, it differs from agitation and anxiety in a caregiving context. Agitation/aggression was rarely described other than reports of instrument scores. Further, agitation/aggression was reported in a variety of ways. Some instruments combine them; others separate them. However, when the behaviors are separately assessed with certain elements of an instrument, we could not always determine whether that instrument is designed to yield valid and reliable subsets of questions. Scales to measure agitation include elements such as restlessness or aimless pacing, repetitive requests and "verbalizations," and so forth. Agitation may be prompted by loss of memory or it may reflect anxiety. If the anxiety is the patient's and not the caregiver's, then its underlying cause must be ascertained (e.g., pain or discomfort or some specific stimulus). Agitated verbal or physical behavior may be annoying and even frustrating to caregivers but is not necessarily a problem requiring treatment. By contrast, verbal and especially physical aggression often require treatment. At best, aggression may arouse fear or disturb the calm of other patients in group settings; at worst, it may cause injury to caregivers or other patients. Aggression is also likely to harm its perpetrator in the form of increased restrictions or temporary or permanent removal to another setting, resulting in increased confusion. For these reasons, aggression is likely to be treated more assertively than various forms of agitation, but the level of agitation/aggression that practitioners feel compelled to medicate is unclear. Ironically, the epidemiology of agitation/aggression is not well understood, from the distribution of agitated behavior to how often various behaviors occur separately or together in the same patient and whether any discernable progression can be observed.

What, then, constitutes a behavior that requires treatment? Or more specifically, when is behavior problematic enough to justify the use of psychoactive medications? Interventions for agitation/aggression address two basic goals: 1) to prevent or minimize untoward events and 2) to manage untoward events when they do arise. These two goals imply different strategies. Preventing or minimizing events can rely on environmental manipulation such as music or light, or activities that create a diversion or draw on strengths of remote memories; it may involve individually based approaches to identify triggers for a given person and subsequently avoid them. (This is essentially the basis for dementia care mapping and for the general stance that agitation/aggression is communication that caregivers need to try to decipher and respond to.) Conversely, managing events once they arise may involve distraction, calming behavior by staff, or moving individuals to a calming environment.

In light of this distinction, preventive strategies should be enacted over long time periods in order to reduce the frequency and/or intensity of events. Likewise, treatments designed to prevent agitation/aggression should produce long-lasting effects, and thus longer-term followup is appropriate. Some of these treatments require staff to change their approach to dealing with individuals with dementia. Sustaining changes that ensue may require support. Other techniques aim to squash or at least diminish agitation/aggression when they arise. Unlike preventive strategies, reactive strategies are in the moment and need to work immediately; however, their effect will not last beyond the episode. Therefore, the measures of success for preventive and reactive approaches should differ. However, we found substantial confusion in distinguishing strategies and measures.

In the case of agitation, one might question the impetus for treatment. Who is upset by this behavior? To the extent that it reflects underlying physiological or psychological problems, such as pain or distress, agitation cues the need for further investigation. However, if agitation is chronic, might it not be addressed differently? Agitated behavior, although it may prove annoying to other patients, may ultimately present more difficulty for caregivers than for patients. Therefore, one approach to dealing with agitation may be to help caregivers better tolerate it. A serene unit with a minimum of uninterpretable behavior or conversation may not be a desirable goal worthy of medicating patients to achieve. If the target is staff understanding and acceptance of agitation, then the measure of success would not be decreased frequency of episodes but rather staff interpretation of the episodes.

We might expect to see interventions tested for effectiveness before being used as the basis for training, but such was not the case. Instead, the line between training studies and interventions proved hard to draw. Several interventions required that staff be trained to behave differently, but the training was sparsely described. Some studies used a combination of outside experts and trained staff to implement interventions.

Changing the behavior of caregiving staff is challenging, especially in nursing homes, where training and oversight is modest at best. Nursing home staff is notoriously overworked and generally not eager to take on new tasks, especially ones that require them to radically alter their typical behavior and routines. Although all nursing homes are required to have in-service educators and to conduct training at intervals, staff training tends to be perfunctory and brief with sparse oversight and encouragement. Maintaining a new behavior requires regular feedback to engender a sense that it is working. Staff training is further complicated by turnover and/or excessive pressure on staff to complete assigned tasks. The more complex and judgmental the intervention, the more difficult it is to implement, especially within nursing home hierarchies. In regard to assisted living and other group residential settings and in-home care services, training requirements are even fewer, dependent largely on state rules. Furthermore, the staff in such settings is harder to define. Some studies used external staff to establish the effectiveness of the behavior; the effects of these interventions have short half-lives because implementation disappears with the end of the study. Relying on staff to administer the intervention increases chances of longer-term success, but doing so is far more complicated. As mentioned, staff must then be trained and supervised. Ultimately, the more an intervention depends on staff, the harder it is to separate it from a training study in research.

Many studies used multiple outcome measures; most failed to make statistical adjustments for the multiple outcomes. The large number of measures may reflect uncertainty about the goals of the intervention or the lack of a good measure.

Few studies accounted for or even described simultaneous therapies, especially psychoactive medications. Further, physical environment was rarely addressed (e.g., private or shared rooms,

freedom or restrictions of movement, policies for dining, bathing, and care routines that may generate resistance). We found few studies of such environmental and practice shifts (other than the training to generate more effective staff) and the environments for these studies were rarely described. Even studies of bathing interventions did not describe usual routines for bathing. In studies of individualized activities, authors provided little sense of the spaces available for such efforts. Most of the nursing home studies took place in multiple facilities, either with facilities or units randomized or with intervention and control groups in each setting of the study. In these cases we know little about how settings varied. Neither setting is included as a dummy variable, but even if it were, sample size would make facility differences in effects hard to find.

Our findings are consistent with many prior reviews, but more pessimistic than others, which showed benefit for certain interventions. A recent systematic review of music therapy for a broad range of behavioral and psychological symptoms found a small effect for anxiety and behavior (broadly defined).[135] Not only did this review include a wider range of symptoms and study designs, but it did not specifically address agitation/aggression. Another recent review that did specifically address agitation concluded that music therapy following protocol failed to produce a sustained benefit.[136] The same review found no evidence of efficacy for aromatherapy or light therapy.[136] In contrast, Livingston et al. concluded that the available evidence showed that dementia care mapping and person-centered care showed efficacy.[136] They included a broader range of study designs, failed to conduct a meta-analysis, and may have concluded efficacy when changes from baseline were present in the absence of differences from control group. Brodaty et al. concluded that caregiver interventions improved behavioral outcomes in community-dwelling individuals with dementia.[137] However, this study included a broad range of psychological and behavioral symptoms and the strongest effects were from studies focusing on depression.

In summary, the evidence for nonpharmacologic treatment of agitation/aggression in individuals with dementia is weak and obfuscated by an inconsistent and confusing terminology. A clearer map and more precise terms are needed to outline the variations in the problem and the links between specific interventions and problem elements. Also needed are more consistent measures and clearer rationales for how the measures address treatment goals as well as appropriate timelines. Simultaneous treatments such as psychoactive treatments must be accounted for. Nonetheless, this line of research will continue to be difficult. The incidence of problems is unpredictable and nursing home environments are unstable.

Applicability

Our conclusions are likely relevant to the broad population of individuals with dementia, but they provide little insight into what interventions might reduce agitation/aggression in this population. The populations described appear similar to the overall population with dementia within each setting, at least by age and sex. Few details were provided regarding other patient characteristics such as dementia type, stage, and severity. When dementia type was described, Alzheimer's disease was typically the most prevalent, consistent with national estimates. Assessing the applicability of results of trials conducted in nursing homes and assisted-living facilities is difficult, however. These facilities vary greatly in size, environments, and staffing models. Few trials described these characteristics, so applicability is unclear.

Many trials were conducted in countries outside of the United States. Nursing home populations and the facilities themselves may differ significantly from one country to another. Therefore applicability to the U.S. population may vary depending on how similar nursing homes and their populations are to those of the U.S.

Research Gaps

Managing agitation/aggression in dementia with nonpharmacologic interventions is a critically important topic. Many trials have been conducted, but the evidence is weak and offers no insight about promising practices. Many research gaps remain (Table H).

Conceptual issues limit what researchers are able to do with available resources. Future trials should use consistent and validated instruments specifically targeted to accurately measure agitation/aggression. Researchers should select the measurement instruments most appropriate to the population, intervention, and purpose of the study. Selected instruments should also be designed to show treatment effects. As far as possible, reports should separate the effects on these two behaviors. Decisionmakers are likely to consider agitated behaviors as more tolerable than aggressive behaviors, especially physically aggressive behaviors that may result in injuries. Therefore, separating these behaviors would provide a more actionable evidence base. Better instruments are needed to accomplish this goal.

Ideally research will proceed more systematically with trials that are adequately powered and designed and conducted without bias. Trials that show potential benefit should be replicated. To better isolate the effects of interventions, researchers must pay closer attention to describing study settings, including whether and which concomitant treatments are used, especially antipsychotics. Only then can effects be appropriately attributed to the nonpharmacologic intervention.

Conclusions

Despite great interest in nonpharmacologic interventions to manage agitation/aggression in dementia, as well as changes in practice toward reducing the use of antipsychotics, the current evidence base does not indicate specific effective approaches. Interventions should be proven effective before being implemented.

Table H. Future research needs

Key Question	Results of Literature Review	Types of Studies; Needed to Answer Question	Future Research Needs
General Methodological Issues	Underpowered studies	RCTs	Funding/conducting RCTs with power adequate to answer the research question is necessary to avoid underpowered studies. Power calculations should incorporate the expected higher rate of attrition common in this population.
	Few groups of studies with sufficient similarity in interventions, comparisons, and outcomes allowing appropriate data pooling	Consensus conference	It would be beneficial to standardize promising practices and study those practices in RCT studies. It would also be beneficial to develop guidance to assist researchers in selecting the appropriate instruments to measure agitation/aggression.
	No established minimum important differences for commonly used instruments measuring agitation/aggression outcomes.	Survey research	It would be beneficial to conduct studies to determine thresholds for commonly used instruments that indicate clinically meaningful changes. These threshold values could be used in comparative effectiveness research.
KQ 1a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia in long-term care?	Study populations in nursing home settings often likely had a wide variety of agitation/aggression behaviors that might respond differently to specific treatments.	RCTs	Patients with similar symptoms could provide the population for intervention trials
KQ 1b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia in long-term care settings?	Harms were rarely reported; most interventions were unlikely to have serious harms.	RCTs	It would be beneficial to record and report harms or lack thereof by group.
KQ 2a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?	Tailored interventions did not demonstrate an effect on behaviors. Few trials specifically targeted agitation/aggression.	RCTs	Patients with similar symptoms could provide the population for intervention trials to determine if certain behavioral symptoms do not respond to nonpharmacologic treatment.
	Caregiver tailored education and training showed benefits to caregivers (improved confidence of managing behaviors). It is unclear if these benefits are maintained after the intervention ends.	RCTs	Long term followup is necessary to determine if caregiver benefits are maintained after intervention ends. Testing could be conducted to determine if booster sessions or long-term psychosocial interventions help maintain

Key Question	Results of Literature Review	Types of Studies; Needed to Answer Question	Future Research Needs
			intervention benefits.
KQ 2b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?	Harms were rarely reported; most interventions were unlikely to have serious harms.	RCTs	It would be beneficial to record and report harms or lack thereof by group.

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Introduction

Background and Objectives

The most recent edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) categorizes individuals with acquired cognitive deficits as having neurocognitive disorders (NCD).[1] Subtypes of NCDs include major and mild neurocognitive disorder due to Alzheimer's disease, major or mild frontotemporal neurocognitive disorder, major or mild neurocognitive disorder with Lewy bodies, and major or mild vascular neurocognitive disorder. Historically, patients with these NCDs have been referred to as having dementia. Because dementia is the far more familiar term, we have used it rather than NCD throughout this report.

Up to 90 percent of those with dementia exhibit behavioral or psychological symptoms at some point, more often in advanced stages of the disease.[2] Symptoms tend to occur in clusters and can include depression, psychosis, aggression, agitation, anxiety, and wandering.[2-4] Behavioral and psychological symptoms cause considerable patient distress and are associated with accelerated functional and cognitive decline. Dementia-related symptoms challenge both formal and informal caregivers and are associated with increases in caregiver anger, resentment toward the patient, stress, and decreased psychological health.[5-7] Not surprisingly, dementia-related symptoms are the leading predictors of institutionalization.[8] However, staff in nursing homes and assisted living facilities are also challenged by behavioral and psychological symptoms, which affect an estimated 80 percent of nursing home and assisted living facility residents with dementia.

Among dementia-related symptoms, agitation and aggression are especially distressing to patients, caregivers, and nursing home and assisted living facility staff. The terms agitation and aggression are used to describe many types of behaviors and many adjectives are used to describe agitated and aggressive behaviors (disruptive, problem, difficult, and challenging). Agitation is defined as "excessive motor activity with a feeling of inner tension and characterized by a cluster of related symptoms including anxiety and irritability, motor restlessness and abnormal vocalization, often associated with behaviors such as pacing, wandering, aggression, shouting, and nighttime disturbance."[9] Aggression is commonly described to be a subtype of agitation[10] consisting of overt harmful actions (physical or verbal) to others that are clearly not accidental.[9] Ultimately, terms describing agitation and aggression in the literature are confusing and inconsistent.[11] We refer to these symptoms or behaviors as agitation/aggression.

Historically, drugs have been used to manage behavioral symptoms in patients with dementia, particularly for agitation/aggression. Pharmacotherapy for behavioral symptoms is based on a biological/genetic framework for the etiology of the condition. However, drug therapies generally, and antipsychotic medications specifically, have limited efficacy and high risk for adverse effects, including mortality.[12-14] Drug treatments for dementia are also associated with reduced quality of life.[15]

Clinical guidelines recommend nonpharmacologic interventions as the first choice for agitation/aggression in patients with dementia.[16-19] However, nonpharmacologic interventions are under-used in clinical practice. In part this is because clinicians lack knowledge regarding their efficacy and possible risks, but caregivers are also reluctant to forsake drugs until they are confident in managing agitation/aggression without them. To reduce inappropriate use of antipsychotics and other psychotropic drugs for behavioral symptoms in patients with dementia

will require evidence for the effectiveness and harms of nonpharmacologic treatments. Clinicians and caregivers will also need education on the use of these approaches.

Nonpharmacologic interventions aim to 1) prevent agitation/aggression behaviors, 2) respond to episodes of agitation/aggression to reduce their severity and duration, and/or 3) reduce caregiver distress. Individuals with dementia may reside in nursing homes or assisted living facilities or in their own homes or with family members (community-dwelling).

Interventions delivered in nursing homes and assisted living facilities can be at the patient level, where a therapy is delivered directly to the patient, or care delivery level, involving the approach, staff, and/or environment used in care delivery. Examples of patient-level interventions used in residential settings include sensory-based approaches such as aroma, bright light, or touch, as well as activity-based approaches involving music, art, or horticulture.[20] Care-delivery level interventions include a variety of care-delivery models, staff/caregiver education and training, and environmental approaches.[21] Examples include trainings to enhance staff knowledge and skills in managing behavioral symptoms among residents, care-delivery models such as patient-centered care or dementia care mapping, and enhancements to the environment aimed at reducing exposure to agitation/aggression triggers.

Interventions delivered to community-dwelling individuals with dementia can be at the patient or caregiver level. The caregiver is typically an informal family caregiver. Patient-level interventions would be similar to those in residential settings. However, patient-level interventions may also include activities, such as exercise classes, that are accessible to individuals in less advanced stages of dementia. Caregiver-level interventions to address agitation/aggression address the family caregiver approach to caregiving. These interventions provide education and skills training to enhance understanding of the disease process, specific symptoms, and how to best address agitation/aggression. Table 1 provides a description and examples of the types of interventions used in various settings.

Ideally, nonpharmacologic interventions reduce the incidence and severity of agitation/aggression individuals with dementia. Measuring behavioral outcomes is a complex process for which a wide variety of instruments are available, These instrumnets are based on different theoretical frameworks, 2) are designed to evaluate behaviors in different settings (e.g., in-home, hospital, or long-term care), 3) are administered by different individuals (e.g., caregiver, nurse, or patient), and 4) use different mechanisms to obtain responses (e.g., interviews with patients or direct observation). More than 45 instruments are used to evaluate behavioral symptoms in dementia, with no gold standard.[22] The appropriate instrument depends on disease severity and context of care (e.g., setting, severity of disease, and whether the purpose is to identify any behavior or to identify specific behaviors). Instruments for evaluating behavioral symptoms fall into two broad categories: *general* and *specific*.[22] Table 2 describes commonly used instruments.

Several instruments measure agitation/aggression specifically. These include the Agitated Behavior in Dementia Scale (ABID),[23] the Cohen-Mansfield Agitation Inventory (CMAI),[24] and the Pittsburgh Agitation Scale (PAS).[25] Also, some general behavioral symptom instruments include subscales specific to agitation/aggression.

General measures evaluate a host of behaviors across multiple domains (e.g., agitation, depression, and wandering). Most studies that report results from general behavioral symptom measures report overall summary scores. Examples of general behavioral measurement instruments include the Neuropsychiatric Inventory (NPI and its variants NPI-C, NPI-Q). The NPI is one of the most commonly used instruments to measure behavior. The Revised Memory

and Behavior Problem Check List and the CERAD Behavior Rating Scale for Dementia are other examples of instruments measuring general behavioral symptoms in individuals with dementia.

Our understanding and measurement of agitation/aggression in individuals with dementia has changed over time. Agitation/aggression are now more often considered distinct behaviors. For example, an early version of the NPI combined agitation/aggression into a single domain. In contrast, the Neuropsychiatric Inventory Clinician (NPI-C), a second-generation survey designed to incorporate input from clinicians, separates the behaviors into two distinct domains.[4] The context in which agitation/aggression occur is considered paramount to determining appropriate interventions. Clinical algorithms have been developed to help identify the presence and causes of symptoms in order to effectively manage behaviors.[26-28] However, instruments often document the occurrence of behavioral symptoms without identifying their source or cause. Ideally, algorithms are used alongside specific instruments to provide appropriate context for the occurrence of behaviors.

Evidence synthesis on the efficacy and comparative effectiveness of nonpharmacologic interventions specifically for agitation/aggression in patients with dementia could reduce the frequency and severity of those behaviors and improve functioning, reduce distress, and reduce or delay residential long-term care. These interventions may also reduce the use of antipsychotic drugs. Results from this review will inform practice regarding the appropriate and effective management of agitation/aggression in individuals with dementia.

To address these gaps in the literature, we conducted a systematic review based on an analytical framework (Figure 1) to address the key questions:

Table 1. Types of interventions addressing agitation/aggression in dementia

Setting ***Intervention Level***	**Intervention Type**	**Examples**
Nursing Homes and Assisted Living Facilities		
Patient level	Sensory	Music therapy (listening), aromatherapy, bright light therapy, multisensory stimulation.
	Structured Activities	Dancing, exercise, social interaction, music therapy (playing, singing), art therapy, outdoor walks
	Complementary and Alternative Medicine	Aromatherapy, reflexology, acupuncture, acupressure, massage, Reki
	Psychological	Validation therapy, reality orientation, reminiscence therapy, support groups
Care Delivery Level	Care Delivery Models	Dementia care mapping; patient centered care
	Staff Training and Education	Specific curriculums for communication, managing behaviors
	Environmental	Walled in areas, wandering areas, wayfinding enhancement, reduced stimulation areas, enhanced environments
Community dwelling		
Patient level	Same as patient-level above	Same as patient-level above
Caregiver level	Caregiver education	Specific curricula to education caregivers about dementia.
	Caregiver education and training	Specific curricula to education caregivers about dementia and build skills to manage behaviors.
	Caregiver education and training with psychosocial support	Specific curricula to education caregivers about dementia and build skills to manage behaviors with additional components such

		as support groups or counseling.

Table 2. Instruments measuring intermediate, primary, and secondary outcomes

Outcome Category Outcome	Instrument	Measurement/Instrument Properties	MIDs Reported in Literature
Intermediate Outcomes			
Caregiver Behavior Change	Caregiving Mastery Index, a subscale of the Caregiving Appraisal Measure	12 items assessing caregiving mastery Range 12-60; higher scores indicate greater mastery[29]	None identified
Primary Outcomes			
Patient Agitation/ Aggression	Agitated Behavior in Dementia Scale (ABID) (aka: Agitated Behavior Inventory for Dementia)	16 items assessing the frequency of agitatation/aggression over the past 2 weeks (each week rated separately and added together for each item) and caregiver distress and reaction once in the last 2 weeks; to be used in noninstitutionalized patients Range 0-48 (care recipient); higher scores indicate greater agitation Range 0-64 (caregiver); higher scores indicate greater reaction[30]	None identified
	Cohen-Mansfield Agitation Inventory	Number of items varies by form (29 items for standard form, 14 items for the short form, 37 items for the community form); assesses the frequency of agitation over the past 2 weeks Range 0-203; higher scores indicate greater agitation[31-33]	≥45 indicates clinically significant agitation requiring treatment[34] 30% change in overall score[35]
	Pittsburgh Agitation Scale	4 items assessing aberrant vocalization, motor agitation, aggressiveness, and resistance to care Range 0-4 per item; higher scores indicate greater agitation[25]	None identified
General Behavior	Behaviour Rating Scale (BMD)	Designed for carers to assess behavior and mood at home.[36]	
	Neuropsychiatric inventory (NPI, and its variants NPI-C, NPI-Q)	12-91 items, varying by domain screening responses; assesses aberrant motor behavior, agitation, anxiety, apathy, appetite and eating behaviors, caregiver distress, delusions, disinhibition, dysphoria, euphoria, hallucinations, irritability, nighttime behavior issues Range depends on screening responses for each domain and responses for frequency and severity; higher scores indicate greater behavioral problems[37]	8 points[38]
	Revised Memory and Behavior Problem Checklist (RMBPC)	24 items; assesses caregiver reactions, depression problems, disruptive behaviors, and memory-related problems Range 0-96 for patient behaviors and 0-96 for caregiver reactions; higher scores indicate greater frequency of behavior problems and greater caregiver distress[39]	None identified
	Memory and Behavior Problem Checklist (MBPC)	Previous version of RMBPC[40]	None identified
	CERAD Behavior Rating Scale for Dementia (BRSD)	51 items in original version, 46 items in revised version, 17 items in short form; assesses affect, aggression, agitation/irritability, apathy, defective self-regulation, depressive features, vegetative features, psychotic features Range unclear; higher scores indicate greater behavioral problems[41]	None identified
	MOUSEPAD	59 items assessing psych symptoms and behavioral disturbances	None identified

Outcome Category Outcome	Instrument	Measurement/Instrument Properties	MIDs Reported in Literature
		(delusions, hallucinations, misidentifications, reduplications, walking, eating, sleeping, sexual behavior, aggression) Range 0-3 per item that assesses severity after yes/no response; higher scores indicate greater behavioral problems[42]	
	Behavior and Mood Disturbance (BMD)	34 items assessing behavioral and mood disturbances (apathy, depression, disinterest, irritability, pacing, wandering, withdrawn behaviors) Range 0-136 (0-4 per item); includes Apathetic-Withdrawn subscale, Active-Disturbed subscale, and Mood-Disturbance subscale; higher scores indicate greater behavioral problems[43]	None identified
	Rehabilitation Evaluation Hall and Baker tool (REHAB)	23 items assessing deviant behavior (physical and verbal aggression) and general behavior (community skills, disturbed speech, self-care, social activity) Range 0-126 for the general behavior subscale and 0-21 for the deviant behavior subscale; higher scores indicate greater behavioral problems[44,45]	None identified
	Behavioral Pathology in Alzheimer's disease (BEHAVE-AD)	25 items assessing activity disturbances, affective disturbances, aggressiveness, anxieties and phobias, diurnal rhythm disturbances, hallucinations, paranoid, and delusional ideation Range 0-75 plus a 4-point global assessment; higher scores indicate greater behavioral problems[46]	None identified
	Multi-dimensional observation scale for elderly patients (MOSES)	40 items assessing depressed/anxious mood, disoriented behavior, irritable behavior, self-care functioning, and withdrawn behavior Range 0-4 or 0-5 per item, total range varies by subscale; higher scores indicate greater behavioral problems[47]	None identified
Secondary Outcomes			
Caregiver Distress	Perceived Change Index	13 items assessing affect, managing caregiving challenges, and somatic symptoms Range 13-65; higher scores indicate worsening in well-being[48]	None identified
Caregiver Burden	Zarit Burden Interview (Brief version)	12 assessing caregiver burden Scores 0-4 per item, total range 0 to 48; higher scores indicate greater burden[49]	None identified
	Zarit Burden Interview	29 items assessing caregiver burden Scoring is 0-4 per item, total range 0 to 116; higher scores indicate greater burden[50]	None identified

Abbreviations: ABID=Agitated Behavior in Dementia; BEHAVE-AD=Behavioral Pathology in Alzheimer's disease; BMD=Behavior and Mood Disturbance; BRSD=Behavior Rating Scale for Dementia; MBPC=Memory and Behavior Problem Checklist; MOSES=Multi-dimensional Observation Scale for Elderly Patients; NPI=Neuropsychiatric Inventory; REHAB=Rehabilitation Evaluation Hall and Baker; RMBPC=Revised Memory and Behavior Problem Checklist

Key Questions

Question 1a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia who reside in nursing home and assisted living settings?

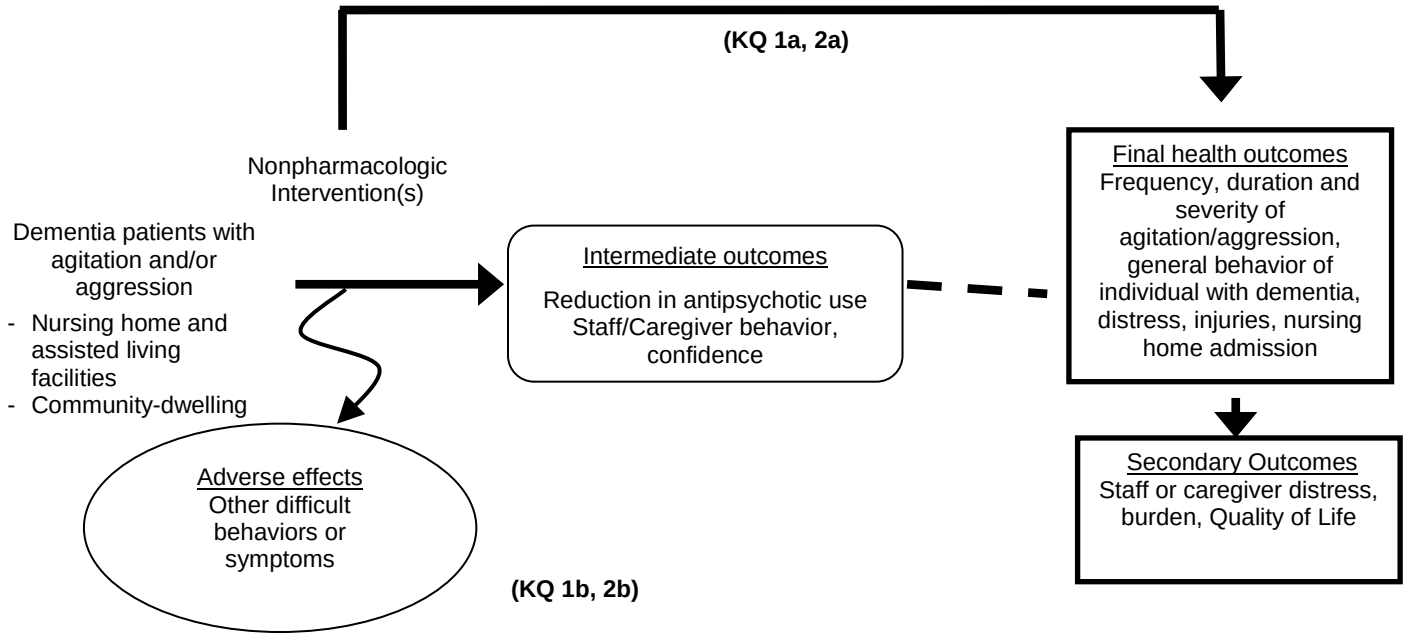
Question 1b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia who reside in nursing home and assisted living settings?

Question 2a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?

Question 2b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?

Analytical Framework

Figure 1. Analytic framework for nonpharmacologic interventions to manage agitation/aggression in dementia



PICOTS

The PICOTS (population, intervention, comparison, outcome, timing, and setting)addressed in this review are described in Table 3.

Table 3. PICOTS

PICOTS Element	Description
Population(s)	KQ1: Individuals with dementia residing in nursing home and assisted living settings; nursing home and assisted living facility staff KQ2: Community-dwelling individuals with dementia; Informal caregivers of individuals with dementia
Interventions	Nonpharmacologic interventions aimed at preventing or responding to agitation/aggression.
Comparators	Usual care (as specified by trial investigators) or no treatment Attention control or placebo (as specified by trial investigators) Other nonpharmacologic interventions Pharmacologic interventions
Outcomes	**Final (Patient) Health Outcomes** KQ1 & KQ2: Frequency, duration, and severity of agitation/aggression; Frequency, duration and severity of aggressive behaviors; General behavior of person with dementia; Distress; Quality of life; injuries to patients, staff, others KQ2: Injuries to patients, caregivers; admission to nursing home **Secondary Outcomes** KQ1: Staff distress, burden, quality of life KQ2: Caregiver distress, burden, quality of life **Intermediate Outcomes** KQ1: Staff behavior change, reduction in antipsychotic use KQ2: Caregiver behavior change, reduction in antipsychotic use **Adverse Effects of Intervention(s)** Increase in other difficult behaviors (i.e., wandering) Increase in other symptoms (i.e., depression, anxiety)
Timing	Any duration of followup. Relevant timing will vary with the nature of the intervention
Setting	KQ1: nursing homes and assisted living facilities KQ2: community-dwelling (patients living at home)

Methods

Criteria for Inclusion/Exclusion of Studies in the Review

Studies were included based on the PICOTS framework outlined above and the study-specific inclusion criteria described in Table 4.

Table 4. Study inclusion criteria

Category	Criteria for Inclusion
Study Enrollment	Studies that enroll one of the following: • Residents of nursing home, assisted living, individuals diagnosed with dementia (any type) with agitation/aggression • Long-term care staff caring for individuals with dementia and associated agitation/aggression • Community-dwelling individuals diagnosed with dementia (any type) with agitation/aggression • Caregivers of community-dwelling individuals with dementia and associated agitation/aggression
Study Objective	Nonpharmacologic intervention aiming to prevent and/or decrease agitation/aggression associated with dementia
Study Design	Randomized controlled trials
Time of Publication	Literature published from 1994 forward (reflects interventions used today)
Publication Type	Published in peer reviewed journals
Language of Publication	English

Searching for the Evidence: Literature Search Strategies for Identification of Relevant Studies to Answer the Key Questions

We searched Ovid Medline®, Ovid Embase®, and the Cochrane Central Register of Controlled Trials (CENTRAL) to identify randomized controlled trials (RCTs). Our search strategy included relevant medical subject headings and natural language terms for concepts of dementia and behavioral symptoms (Appendix A). These concepts were combined with filters to select RCTs. We screened bibliographic database search results for studies relevant to our PICOTS framework and study-specific criteria. Titles and abstracts were reviewed by two independent investigators to identify studies meeting PICOTS framework and inclusion/exclusion criteria. Titles and abstracts identified as potentially eligible by either investigator underwent full-text screening. Two investigators decided eligibility based on full-text review, consulting with a third investigator as necessary to resolve differences. We documented the exclusion status of articles undergoing full-text screening (Appendix B).

We searched ClinicalTrials.gov using “dementia” as the condition. Search results were scanned to identify studies, outcomes, and analyses not reported in the published literature. These results also informed our assessment of publication and reporting bias and inform future research needs. However, search results for this topic were not typically on target. Trial registration of behavioral intervention and/or in psychiatric, psychological, or dementia research does not appear to be common.

Data Abstraction and Data Management

RCTs meeting inclusion criteria were distributed among investigators for data extraction. Data fields extracted included author, year of publication; setting, subject inclusion and

exclusion criteria, intervention, and control characteristics (intervention components, timing, frequency, and duration). We extracted additional data from studies assessed as low or moderate risk of bias (assessment method described below). Relevant data were extracted into evidence tables. This data will be uploaded into the Systematic Review Data Repository after completion of final report.[51]

Assessment of Methodological Risk of Bias of Individual Studies

Two investigators independently assessed risk of bias of eligible studies using instruments developed for the project based on AHRQ guidance.[52] Overall summary risk of bias assessments for each study were classified as low, moderate, or high based on the collective risk of bias inherent in each domain and confidence that the results are believable given the study's limitations. Investigators conferred to reconcile discrepancies in overall risk of bias assessments when one investigator assessed the study as high risk of bias. In certain situations, a third party was consulted to reconcile the summary judgment.

Data Synthesis

We summarized the results in detailed tables for each unique population and intervention type. We did not identify established minimum important differences for key outcomes measurement instruments. We primarily synthesized results across conceptually similar comparisons and outcomes using qualitative synthesis. When comparisons could be reasonably pooled (i.e., comparable interventions and outcomes), we meta-analyzed the data using a Knapp-Hartung random effects model in Stata.[53] We calculated risk ratios (RR) and/or absolute risk differences (ARD) with the corresponding 95 percent confidence intervals (CI) for binary primary outcomes. Weighted mean differences (WMD) and/or standardized mean differences (SMD) with the corresponding 95 percent CIs were calculated for continuous outcomes. We assessed the clinical and methodological heterogeneity and variation in effect size to determine appropriateness of pooling data.[54] We assessed the magnitude of statistical heterogeneity with the I^2 statistic.[54]

Grading the Strength of Evidence for Major Comparisons and Outcomes

The overall strength of evidence for primary outcomes within each patient/caregiver population, intervention comparison, and outcome combination was evaluated based on five domains: 1) study limitations (risk of bias); 2) directness (single, direct link between intervention and outcome); 3) consistency (similarity of effect direction and size); 4) precision (degree of certainty around an estimate), and 5) reporting bias.[55] Based on study design and risk of bias of the individual studies within the comparison, study limitations were rated as low, medium, or high. Consistency was rated consistent, inconsistent, or unknown/not applicable (e.g., single study) based on whether intervention effects were similar in direction and magnitude, and the statistical significance of all studies. Directness was rated direct or indirect based on whether the outcome was a final patient-centered outcome or an intermediate or secondary outcome. Precision was rated precise or imprecise based on the degree of certainty surrounding each effect estimate or qualitative finding. Imprecise estimates include clinically distinct conclusions within the confidence interval. Reporting bias was evaluated by the potential for publication bias by

comparing studies identified and considered potentially eligible from gray literature searches to identified published studies. Other factors considered in assessing strength of evidence included dose-response relationship, the presence of confounders, and strength of association.

Based on these factors, the overall strength of evidence for each outcome was assessed:[55]

High: Very confident that estimate of effect lies close to true effect. Few or no deficiencies in body of evidence, findings believed to be stable.

Moderate: Moderately confident that estimate of effect lies close to true effect. Some deficiencies in body of evidence; findings likely stable, but some doubt remains.

Low: Limited confidence that estimate of effect lies close to true effect; major or numerous deficiencies in body of evidence. Additional evidence is necessary before concluding that findings are stable or that estimate of effect is close to true effect.

Insufficient: No evidence, unable to estimate an effect, or no confidence in estimate of effect. No evidence is available or the body of evidence precludes judgment.

Assessing Applicability

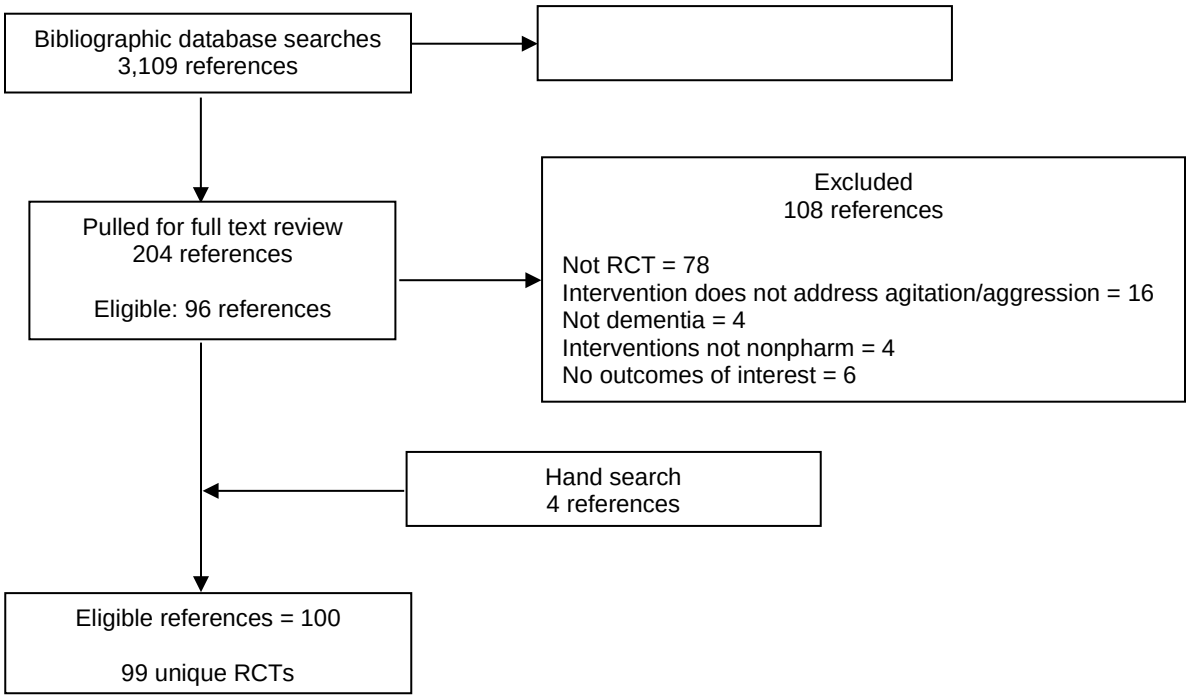
Applicability of studies was determined according to the PICOTS framework. Study characteristics affecting applicability included the population from which the study participants are enrolled, diagnostic assessment processes, narrow eligibility criteria, and patient and intervention characteristics different than those described by population studies behavioral symptoms in dementia.[56]

Results

Literature Search and Screening

Our search identified 3,109 unique citations, of which 204 required full-text review after title and abstract screening (Figure 2). We completed full-text review and hand searched key systematic reviews to identify 100 eligible references representing 99 unique studies. Studies excluded after full-text review are listed in Appendix B along with exclusion reasons. The most frequent exclusion reasons included a lack of randomization and that the intervention did not address agitation/aggression.

Figure 2. Literature flow diagram



We divided the unique studies into three categories for analysis based upon the setting in which the interventions occurred:

- Patient-level interventions delivered in nursing home and assisted living facility settings (n=54)
- Care-delivery level interventions delivered in nursing home and assisted living facility settings (n=23)
- Patient-level interventions delivered to community-dwelling individuals with dementia (n=3)
- Caregiver-level interventions delivered to caregivers of community-dwelling individuals with dementia (n=20; 19 unique RCTs)

We extracted basic study characteristics into evidence tables. These data will be transformed into the appropriate format, checked for accuracy, and then uploaded to the Systematic Review Data Repository after the final version of this report is posted. Supporting documentation for each category of interventions including risk of bias assessments of individual studies, descriptions of high-risk-of-bias trials, and strength of evidence assessments of unique

interventions, comparisons, and outcomes appear in Appendix C for patient-level nursing home and assisted living facility interventions, Appendix D for care delivery level nursing home and assisted living facility interventions, Appendix E for patient-level community interventions, and Appendix F for caregiver-level community interventions.

Patient-Level Nonpharmacologic Interventions for Agitation/Aggression in Individuals With Dementia in Nursing Homes and Assisted Living Facilities

Key Points

- Low strength evidence shows that music interventions, aromatherapy with lavender, and bright light therapy are similar to no intervention, placebo, and/or attention control in decreasing agitation/aggression among nursing home and assisted living facility residents with dementia.
- Low strength evidence shows that interventions tailored to patient skills, interventions tailored to patient interests, and interventions delivered to both skills and interests have similar effects on agitation/aggression among nursing home and assisted living facility residents with dementia.
- Evidence was insufficient for all other outcomes and comparisons.

Overview

We identified 54 eligible trials that assessed patient-level nonpharmacologic interventions for agitation/aggression in residents of nursing homes and assisted living facilities. Of these, 22 were assessed as having a high risk of bias. These studies are described in Appendix C. Our analysis of the remaining 32 trials is provided below by intervention type (Tables 5 and 6). Trials with acceptable risk of bias examined a wide variety of interventions including therapies delivered directly to patients (e.g., music therapy, aroma therapy, bright light therapy), structured group activities (e.g. exercise), and activities specifically tailored to the individual. We grouped studies by intervention type and comparison. All studies were trials but they differed in the unit of randomization (i.e., at nursing home level, staff, or residents). Table 5 provides a summary of the results by intervention type and comparison. Table 6 provides results for trials analyzed.

Music

Eligible Trials

We identified four trials with acceptable risk of bias that assessed the efficacy of music interventions on agitation/aggression in nursing homes and/or assisted living facilities.[57-60] Four trials, including two of those mentioned above, compared music interventions with other active therapies. Sakamoto et al. compared two types of music interventions in two of the three arms of the trial.[57] Remington et al. compared calming music with hand massage.[60]Cooke et al. compared a music intervention with interactive reading.[61] Vink et al. compared a music intervention with recreational activities.[62]

One trial was conducted in Japan, one in Taiwan, one in the United States, and one in Italy. Inclusion criteria varied; most trials required participants to have behavioral symptoms as well as a diagnosis of dementia. Two trials studied music interventions delivered to groups of residents[58,59] and two to individuals.[57,60] Comparisons included usual care, no treatment, and attention controls. Music intervention sessions varied in length (10 to 30 minutes), frequency (one

time, weekly, 3 times per week) and duration (one time to 6 months). Type and number of staff involved in the intervention also varied.

Sakamoto et al. randomized 39 dementia residents to a passive music intervention (n = 13), an active music intervention (n = 13), or a no-music control (n = 13).[57] Residents were recruited from four nursing homes in Kobe City, Japan. Inclusion criteria included a diagnosis of dementia according to DSM IV criteria and a severity in the Dementia Rating Scale of 3 or more. Those with hearing disorders, heart disease, hypertension, or diabetes were excluded because of the autonomic nervous system measures being used. Those with a history of playing a musical instrument were also excluded. The mean age of residents randomized to passive music was 79.7 years and most were female (76 percent). Similar characteristics were observed for the active music group (mean age 80.42 years and 85 percent female) and no-music control (mean age 81.5 years and 85 percent female). In the passive music intervention participants listened to CDs; in the active music intervention a music therapist led the group and encouraged them to clap, sing, and/or dance while listening. The comparison group had a staff member sit with the resident for the same amount of time in his or her room with no music. Interventions were delivered for 30 minutes once a week for 10 weeks. Patient agitation/aggression was measured using the BEHAVE-AD Aggressiveness subscale after the tenth intervention and 3 weeks postintervention. Mean BEHAVE-AD scores were similar for the three groups after the tenth intervention and 3 weeks postintervention. General behavior was measured using the Behavioral and Social Symptoms of Dementia (BPSD) scale and the BEHAVE-AD scale; mean scores were similar for the three groups after the tenth intervention and 3 weeks postintervention. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Lin et al. randomized 100 individuals with dementia in three Taiwan nursing homes to music therapy (n = 49) or a usual care control. (n = 51).[58] Residents needed to be diagnosed with dementia and to speak Mandarin or Taiwanese. The mean age of residents randomized to the intervention group was 81.46 years and 53 percent were female. Demographic characteristics of residents in the usual care group were similar (mean age 82.15 years and 53 percent were female). The intervention group received 30-minute sessions twice a week for a total of 12 sessions over 6 weeks. Sessions were led by the study investigators who received training in music therapy. Sessions focused on various musical activities. Examples of musical activities included rhythmical music and slow-tempo instrumental activities, therapeutic singing, and listening to specially selected music. Residents in usual care did not receive music therapy and they continued to engage in normal daily activities. Agitation/aggression was measured using the validated Chinese version of the Cohen-Mansfield Agitation Inventory administered after the sixth and twelfth sessions and at 1 month postintervention. Unadjusted overall mean scores were similar between intervention and control at each time point. The authors also separately analyzed the four behaviors making up the Cohen-Mansfield Agitation Inventory. Unadjusted means were similar between groups at each time point. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Raglio et al. randomized 60 individuals with dementia residing in five nursing homes near Milan, Italy, to a group music intervention (n = 30) or usual care (n = 30).[59] Usual care was not specifically described. Participation required a dementia diagnosis and moderate or high behavioral symptoms. The mean age of residents randomized to the experimental group was 85.4 years and 97 percent were female. The mean age of residents randomized to the control group was 84.6 years and 87 percent were female. The music intervention consisted of three 30-minute music therapy sessions per week for 1 month, alternating with a 1-month washout period for a

total of 36 musical therapy sessions over 6 months. Three residents participated in a music session at a time. During music sessions, residents and a music therapist interact and express emotions and behaviors through musical instruments. All residents in the intervention and control group received standard care (e.g., educational and entertainment activities). Agitation/ aggression was measured with the NPI agitation subscale at baseline, the end of the intervention, and one-month after the last washout period. Group differences were not tested and standard deviations were not provided. Postintervention general behavior measured with the global NPI (reported graphically only) was lower in the intervention group ($F_{1,51}$=4.84, $p<0.05$); statistical testing of followup scores was not provided. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Remington et al. randomized 68 dementia nursing home residents to four arms: calming music (n = 17), hand massage (n = 17), calming music plus hand massage (n = 17), or no treatment (n = 17).[60] Residents with dementia who were identified as having agitation/aggression were invited to participate in the study. Mean age of all study participants was 82.4 years and most were female (87 percent). The comparison of interest for assessing the efficacy of music interventions is that of the 34 residents randomized to music or no treatment. Residents were randomized to treatment immediately prior to receiving the intervention. If the resident did not show signs of agitation (CMAI score = 0) then assignment to treatment was delayed. The music intervention consisted of 10 minutes of calming music (a new age arrangement of Pachelbel's Canon in D) played on a CD player one time. The music was played in patient rooms or family lounge areas at a level slightly higher than background noise, but was low enough to allow for conversation. Agitation/aggression was measured using the CMAI immediately after and at 10, 20, and 60 minutes after the intervention; agitation/aggression decreased more with calming music than with no treatment. At followup (60 minutes) residents in the control group exhibited more agitation/aggression than residents in the treatment groups ($p <0.05$). No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Vink et al. randomized 94 individuals with dementia and behavioral symptoms from six Dutch nursing homes to music (n = 47) or a recreational activity (n = 47).[62] The mean age of residents randomized to music therapy was 82.42 years and 67 percent were female. In the recreational activity group, the mean age of residents was 81.76 years and 74 percent were female. The music intervention was delivered by trained music therapists to groups of five residents at a time. The semi-weekly 40-minute music therapies followed a structured protocol in which participation was encouraged. The comparison group received the same amount of group recreational activities facilitated by occupational therapists. Examples of recreational activities include handwork, playing shuffleboard, and playing puzzle games. Agitation/aggression was measured using the modified CMAI 1 hour before sessions, and 1, 2, and 4 hours after sessions. Agitation/aggression postintervention did not differ between residents in the music and recreational activity group. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Cooke et al. conducted a crossover trial in 47 nursing home residents, comparing a live music intervention (n = 24) with an interactive reading intervention (n = 23).[61] The study was conducted in two facilities in Australia. Residents with dementia were required to have a history of agitation/aggression in the past month. Overall mean age of study residents was not reported and most participants were female (70 percent). The music intervention was led by performing musicians and supplemented by a 10-minute rest period of supplemental recorded music. The musicians selected music based on participant preferences. Residents received 40-minute

sessions 3 times a week for 8 weeks for a total of 24 sessions. Singing, clapping, dancing, or even playing an instrument was encouraged. The comparator was a reading group intervention that included jokes, puzzles, and quizzes. This group was also encouraged to interact with the activities. After the first cycle of interventions, participants crossed over to the other intervention. Agitation/aggression was measured with the Cohen-Mansfield Agitation Inventory short-form and the Rating Anxiety in Dementia scale and was reported at baseline, after the first intervention cycle, and at the end. Agitation/aggression was similar in music and reading groups after the first intervention cycle, before crossover. General behavior was also similar. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence Assessment

One trial showed a benefit for agitation/aggression with music compared with no treatment; this trial examined a simple one-time 10-minute recorded calming music in the resident's room and found an improvement in agitation/aggression immediately after and for 10 and 20 minutes after the intervention.[60] All other trials showed similar results to control groups. The trial with positive findings differed from the trials with null findings. The three trials with null findings approached music therapy as having a prolonged and sustained effect on agitation/aggression because they measured outcomes at a variety of time points throughout the long-term trial. We could pool results for only two of the three trials, showing no difference in agitation/aggression between intervention and control postintervention (standardized mean difference -0.18; 95% CI: -2.41 to 2.05) (Figure 3). Low strength evidence shows that music interventions are similar to control in decreasing agitation/aggression in dementia over a period of time.

The trial showing a positive relationship between calming music and agitation/aggression treated the intervention as having an immediate effect by measuring the outcome just after the intervention and again within 30 minutes after the intervention.[60] This evidence is insufficient to draw conclusions regarding the efficacy of music to immediately decrease agitation/aggression among individuals with dementia.

Neither of the trials that compared music interventions with other interventions showed differences between between groups on agitation/aggression. Low strength evidence suggests that music interventions are not more or less effective at decreasing agitation/aggression in dementia compared with active comparison interventions. One of these trials (n = 26) also reported a general behavior outcome.[57] Music and other interventions were similar for general behavior outcomes.

Aromatherapy

Eligible Trials

Aromatherapy interventions include inhalation or application of scented essential oils. Efficacy studies often used placebo aromas or sprays such as sunflower oil. We identified four trials with acceptable risk of bias that assessed the efficacy of aromatherapy in nursing home residents with agitation/aggression.[35,63-65] Three trials studied lavender[63-65] and one studied Melissa oil.[35] Trials were conducted in nursing homes in Australia, Japan, Hong Kong, and the United Kingdom.

Fu et al. randomized 67 nursing home residents with dementia and a history of agitation/aggression or aggression from three nursing home and assisted living facilities in Australia to lavender aromatherapy with massage (n = 22), lavender aromatherapy without

massage (n = 23), or placebo aromatherapy (water sprays) (n = 22).[63] Mean age of residents in the study was 84 years and more than half of participants were female (59 percent). Aromatherapy treatments were given twice a day, 7 days a week, for 6 weeks. Hand massage was done for 5 minutes (2.5 minutes per hand) twice a day for 10 days. Agitation/aggression measured with the Cohen-Mansfield Agitation Inventory-Short Form was similar across the three groups. Overall scores were not reported; item specific means were analyzed at several time points. Postintervention means were similar across the three groups at all time points. No intermediate or secondary outcomes were reported.

Fujii et al. randomized 28 dementia residents with behavioral symptoms of one nursing home facility in Japan to lavender aromatherapy (n = 14) or no treatment (n = 14).[64] The mean age of participants was 78 years and most were female (68 percent). Two drops of lavender oil were applied to residents' clothing three times a day approximately 1 hour after meals for 4 weeks. At the end of the intervention (4-weeks), general behavior measured with the NPI was similar with intervention and control. No intermediate or secondary outcomes were reported.

Lin et al. randomized 70 nursing home residents to lavender aromatherapy (n = 35) or sunflower inhalation (n = 35).[65] Residents with dementia and significant agitation/aggression were invited to participate in the study. The mean age of all study participants was 78.29 years and 59 percent were female. Half of the study participants were first assigned to aromatherapy for 3 weeks and then switched to control group for another 3 weeks; the other half did the opposite, with a 2-week washout period between treatments. Results are only presented for the time period before the second intervention cycle. Aromatherapy was delivered by diffusing lavender oil for at least 1 hour near the patient's pillow each night. Postintervention agitation/aggression measured with the Chinese version of the Cohen-Mansfield Agitation Inventory and general behavior measured with the Chinese version of the Neuropsychiatric Inventory were similar with intervention and control at the end of the intervention. Psychotropic medication use postintervention did not change or differ between groups. No other intermediate or secondary outcomes were reported.

Ballard et al. randomized 72 nursing home residents in the United Kingdom to 4 weeks of aromatherapy with essential oils (Melissa) (n = 36) or placebo (sunflower oil) (n = 36).[35] Residents with dementia and with clinically significant agitation/aggression were invited to participate in the study. The mean age of residents randomized to the intervention group was 77.2 years and 56 percent were female. The mean age of residents randomized to placebo was 79.6 years and 64 percent were female. Aromatherapy was delivered in a lotion applied by staff to patients' faces and arms twice a day. At 4 weeks from baseline residents in the Melissa oil group were significantly more likely than residents in the placebo group to experience a 30 percent reduction in CMAI scores (60% vs. 14%; χ^2=16.3; p<.0001). A 30 percent reduction in CMAI scores represents a clinically significant improvement. The change in the proportion of patients prescribed additional psychotropic drugs was similar with intervention and control. No significant side effects were observed; one patient in the treatment group experienced 2 days of diarrhea.

Evidence Synthesis and Strength of Evidence

Only one of four trials showed that aromatherapy improved agitation/aggression compared with inactive controls.[35] The trial that showed an aromatherapy effect differed from those showing null effects in that it used a different scent (Melissa) than the others (lavender). The scent was also applied to the patient in lotion form by a staff member. Delivery methods in the other three trials did not appear to involve touch. Methodological limitations of the eligible

studies and imprecise estimates provide insufficient evidence for the effectiveness of aromatherapy for agitation/aggression in dementia. Low strength evidence suggests that aromatherapy with lavender is not effective in managing agitation/aggression in individuals with dementia. Evidence was insufficient to draw conclusions about the efficacy of Melissa in reducing agitation/aggression in dementia.

Bright Light

Eligible Trials

Light therapy interventions included some variant of bright light therapy (BLT). Patients were exposed to full spectrum versus active control light (red dim light) or standard light. BLT sessions were typically 1 to 2 hours per day at varying times of day. We identified four trials that studied the efficacy of light therapy with acceptable risk of bias.[66-69] Treatment lasted an average of 2 weeks.

Burns et al. randomized 48 residents of two nursing homes to bright light (n = 22) or standard light (n = 26).[67] Both homes specialized in dementia and behavioral disturbances and all participants had dementia, sleep disorders, and a history of agitation/aggression. The mean age of residents randomized to bright light therapy was 84.5 years and 73 percent were female. Characteristics of residents in the standard light group were similar (mean age of 82.5 years and 62 percent were female). Residents were exposure to treatment during the second and third weeks. Residents in the BLT group were exposed to full spectrum BLT 10,000 lux. Residents in the standard light group were exposed to standard light at 100 lux. In both groups, exposure was for 2 hours daily between 10 a.m. and noon for 2 weeks. During each light therapy (bright light and standard light) a nurse was present and engaged residents in conversation. Agitation/aggression measured with the CMAI and general behavior measured with the Crichton Royal Behavior Rating Scale and MOUSEPAD were similar with BLT and standard light at 4 and 8 weeks. No intermediate or secondary outcomes were reported.

Dowling et al. randomized 70 residents with severe dementia, sleep disorders, and rest-activity disruptions (i.e., agitation/aggression) in two nursing homes in the United States to morning bright light (n = 29), afternoon bright light (n = 24), or usual indoor light (n = 17).[68] The mean age of randomized participants was 84 years and 81 percent were female. In the morning bright light group BLT was administered from 9:30 to 10:30 a.m., and in the afternoon bright light group BLT was administered from 3:30 to 4:30 p.m. In both bright light groups, BLT (>2,500 lux) was administered daily (Monday-Friday) for 10 weeks. Residents in the control group received usual indoor light (150 to 200 lux) and participated in regularly scheduled activities. Outcomes were measured at the end of the baseline week and after the last week of intervention. Agitation/aggression measured with the NPI-NH agitation subscale increased more with morning light group than standard light ($t_{1,55}$ =-2.25, p=0.015) largely because scores in the standard light group decreased. General behavior measured with the NPI-NH overall scores was similar for intervention and control. The authors mention that this subscale change with bright light is likely not clinically meaningful despite its statistical significance. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Ancoli-Israel et al. randomized 92 residents with dementia from five U.S. nursing homes to morning bright light (n = 30), morning dim red light (n = 31), or evening bright light (n = 31).[66] The mean age of study participants was 82.3 years and 68 percent were female. For residents randomized to morning and evening bright light, an Apollo Bright-Light box was placed one

meter from the patient for a resulting exposure of 2,500 lux. An eye-level photometer was used to ensure correct light exposure. The inactive control, dim red light, was administered with a red light box resulting in exposure equivalent to typical room light levels (<300 lux). In all groups, residents were exposed to light for 2 hours daily for 10 days. Morning bright light and morning dim red light were administered from 5:30 to 11:30 a.m. Evening bright light was administered from 9:30 to 11:30 p.m. During the administration of light therapy residents could engage in any activity as long as they remained facing the light. Outcomes were assessed and analyzed separately by morning and evening staff. Agitation/aggression measured with the CMAI was similar between the groups and for morning and evening staff assessments. Agitation/aggression was also assessed separately with the Physical and Verbal Agitation ratings from the Agitated Behavior Rating Scale (ABRS). Means were similar between groups. No group differences were reported for morning or evening assessments. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Lyketsos et al. randomized 15 nursing home residents with dementia and agitation/aggression to bright light or dim light.[69] Mean age of study participants was 80.8 years and 93 percent were female. Bright light (10,000 lux full spectrum lamp at 3 feet from patient) was administered daily for 1 hour for 4 weeks followed by 1 week of no treatment prior to being crossed over to the other intervention. During the administration of light therapy residents could engage in any activity as long as they faced the light. Residents in the control group were exposed to a dim, digital, low frequency light. Outcomes were assessed at 2 and 4 weeks after treatment assignment, combined and reported at the patient-intervention level after both groups received both interventions. Agitation/aggression measured with BEHAVE-AD aggression subscale and general behavior measured with BEHAVE-AD global rating was similar with bright light and dim light. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

Four trials assessed the efficacy of BLT to manage agitation/aggression among dementia residents in nursing homes and assisted living facilities.[66-69] The four trials measured agitation/aggression with different scales and time points. Of the eight postintervention outcomes reported, only one showed a statistically significant difference between groups. The authors admit that this small change in the instrument is likely not clinically meaningful. Only two trials provided sufficient data for pooling (Figure 4). Bright light therapy had an effect similar to standard light in improving agitation/aggression in individuals with dementia (standardized mean difference=0.09; 95% CI: -0.32 to 0.50). Low strength evidence suggests that bright light therapy is not effective in managing agitation/aggression among nursing home and assisted living facility residents with dementia.

Therapeutic Touch

Eligible Trials

Therapeutic touch refers to transfers of energy without necessarily using actual physical touch. Typically, a practitioner sits next to the patient and places his or her hands on or near the patient to transfer energy. We identified two studies with acceptable risk of bias on therapeutic touch. These include Woods et al.[70] and Hawranik et al.[71]

Hawranik randomized 51 residents with dementia and agitation/aggression from the personal care and special needs unit of a nursing home to therapeutic touch (n = 17), simulated

therapeutic touch (n = 16), and usual care (n = 18).[71] The mean age of all study participants was 82.8 years and 71 percent were female. Therapeutic touch is based on ancient healing practices and involves practitioners touching with the patient or passing hands several inches from the patient. Therapeutic touch was conducted by trained practitioners. Volunteers were recruited to administer the simulated therapeutic touch (i.e., passing hands several inches from the patient). Therapeutic touch and simulated therapeutic touch were each given in 30 to 40 minute sessions once/day for 5 days. At baseline there were no differences in physically aggressive or verbally agitated behaviors between groups as measured by CMAI subscales. From baseline to the end of 5 days of intervention, there were significant differences between the three-treatment groups (therapeutic touch, simulated therapeutic touch, and usual care) (χ^2 = 5.98, $p<0.05$). These differences are explained by an increased rate (2.3 times 95% CI 0.66 to 7.81) of physically nonaggressive behaviors (a subscale of the CMAI) in usual care compared with therapeutic touch. However, there were no differences between groups in the CMAI subscales of physically aggressive, physically nonaggressive, or verbally agitated behaviors at 24 hours after the final intervention, 1 week post-intervention, or 2 weeks post-intervention. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Woods randomized 57 residents with dementia and behavioral symptoms in the special care units of three Canadian nursing homes to therapeutic touch (n = 19), placebo therapeutic touch (n = 19), or usual care (n = 19).[70] The mean age of study participants was 81.04 years and 81 percent were female. Therapeutic touch consisted of a trained therapist providing contact on the neck and shoulders. Residents in the placebo therapeutic touch group received a simulated therapeutic touch (i.e., the treatment resembled therapeutic touch). Therapeutic touch and placebo therapeutic touch were given twice daily (between 10:00 and 11:30 a.m. and between 3:00 and 4:40 p.m.) for 5 to 7 minutes per session for 3 days. Behavioral observation was completed every 20 minutes from 8 a.m. to 6 p.m. for 3 days pre-intervention and for 3 days postintervention by trained observers blinded to group assignment. Mean behavioral symptoms of dementia appear similar across groups postintervention. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

Two trials assessed the efficacy of therapeutic touch to manage agitation/aggression among dementia residents in nursing homes.[70,70] The two studies measured agitation/aggression with different scales. One of the studies reported a statistically significant difference between groups.[70] This difference was small and is unlikely to be clinically meaningful. Evidence was insufficient to draw conclusions regarding the effectiveness of therapeutic touch for agitation/ aggression in dementia.

Massage

Eligible Trials

We identified two trials testing the efficacy of massage for agitation/aggression in dementia. In two of three trial arms, Remington et al. compared hand massage with no treatment.[60] Rodriguez-Mansilla et al. compared back and lower limbs massage by physiotherapists for 20 minutes every day with no treatment in two of three arms.[72]

Remington et al. randomized 68 nursing home residents to four arms: calming music, hand massage, calming music plus hand massage, or no treatment. Details of this study are provided in

the music intervention versus passive control section. The three active arms are relevant to the comparative effectiveness of massage interventions for agitation/aggression. The music intervention consisted of 10 minutes of calming music played on a CD player one time. The hand massage intervention consisted of 10 minutes of hand massage, 5 minutes per hand. The hand massage/calming music group received both interventions simultaneously. Agitation/aggression was measured with CMAI immediately and at 10 and 20 minutes after the intervention; agitation/aggression reduced similarly in each of the active arms. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Rodriguez-Mansilla et al. randomized 120 residents with dementia in three Spanish nursing homes to massage (n = 40), ear acupuncture (n = 40), or control (n = 40). The mean age of residents across all three groups was similar (massage = 85.8 years, ear acupuncture = 85.4 years, and control = 81.9 years), and most residents in the study were female (77 percent). The massage therapy arm is compared with the no treatment arm for efficacy of massage. The massage therapy group received a relaxing 20-minute massage of the back and lower limbs by a physiotherapist 5 days per week over 3 months. A qualified acupuncturist provided ear acupuncture. The acupuncturist applied Shenmen Muscle relaxant located in the peripheral inferior concha, close to the spleen and liver with adhesive herbal seeds of Wangbuliuxing (Semen Vaccariae Segetalis). The seeds were placed with adhesive tape and replaced with new seeds every 15 days for 3 months. The control group received no experimental therapy. General behavior was measured with an investigator-designed instrument asking staff about the number of behavioral alterations. General behavior improved more in the intervention versus control group postintervention and was maintained at followup. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

Two trials assessed the efficacy of massage to reduce agitation/aggression in dementia in nursing home residents.[60,72] Both were trials with multiple arms. Remington et al. reported an agitation/aggression outcome;[60] Rodriguez-Mansilla et al. reported general behavior.[72] Studies had methodological limitations and estimates were imprecise. Evidence is insufficient to draw conclusions about the effect of massage on agitation/aggression or general behavior among nursing home residents with dementia.

Comparisons Between Tailored and Nontailored Interventions

Eligible Trials

We identified three trials with acceptable risk of bias that compared tailored interventions with nontailored interventions.[73-75] The interventions varied on the resident characteristics used for tailoring. One tailored the intervention based on Montessori model,[75] another on the unmet needs,[73] and the third on balancing arousal throughout the day according to the patients' response to different activities.[74]

Van der Ploeg et al. conducted a crossover trial in which 44 dementia residents with agitatation/aggression in nine Australian nursing home and/or assisted living facilities were randomized to personalized one-on-one activities according to the Montessori model (n = 15) or nonpersonalized activity (n = 29).[75] The mean age of study participants was 78.1 years and 68 percent were female. A single target behavior was selected for each resident based on nurse CMAI ratings of the residents' behavior. Residents randomized to Montessori participated in

structured one-on-one activities. Up to 10 activities were selected by trained activity facilitators based on the residents' former interest and hobbies. Examples of activities include singing along to music and arranging flowers. The control condition received nonpersonalized activity. Both groups were exposed to the activity for 30 minutes twice weekly resulting in a total of four sessions over 2 weeks. After 2 weeks study participants crossed over. Nursing homes committed not to modify psychoactive drugs during the 4-week study period. Agitation/aggression occurred at similar rates during and after the intervention in the intervention and control groups. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Cohen-Mansfield et al. randomized 125 dementia residents with agitation/aggression in nine Maryland nursing homes to a tailored intervention (n = 89) or placebo control (n = 36). The mean age of study participants was 85.7 years and 74 percent were female. The intervention is referred to as the TREA (Treatment Route for Exploring Agitation) intervention.[73] TREA includes making a baseline assessment from multiple sources, hypothesizing unmet needs, and developing an intervention designed to meet resident needs based on interests, preferences, and past identity. A trained RA conducted observations and recommended interventions to staff. The control group received general staff training on resident behavior. Agitation/aggression was measured with the Agitation Behavior Mapping Instrument and was analyzed using a two-way repeated-measures analysis of covariance. This showed that agitation/aggression decreased more with intervention [8.76 (5.61) to 2.08 (2.68)]than control[7.16 (7.61) to 7.92 (9.09)]. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Kovach et al. randomized 78 dementia residents with agitation/aggression from 13 Midwest nursing homes to a tailored intervention (n = 36) or control (n = 42). The mean age of study participants was 86.57 years and 91 percent were female. The tailored intervention sought to decrease agitation/aggression by manipulating resident daily activities to achieve an optimum balance between states of high and low arousal.[74] Research assistants designed the new activity plan during the first assessment and the second planning stage, and the plan was implemented by regular staff for 7 days. Agitation/aggression was measured using a visual analog scale rated from 0–100 by trained observers. Difference in change in scores was similar with intervention or control (Pretest to Posttest * group: $F_{1,69}$=4.26; p=0.43). The difference in the change between groups was not tested. Mean scores postintervention were similar, but the intervention group had higher baseline scores. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

Three trials studied three tailored activities for agitation/aggression in dementia.[73-75] Only one trial showed reduced agitation/aggression with tailored activities compared with nontailored activities.[73] These studies had methodologic limitations and imprecise estimates. In addition to the inconsistency, this rendered the evidence insufficient to draw conclusions regarding the effectiveness of tailored activities compared with nontailored activities.

Comparisons Between Different Tailored Activity Interventions

Eligible Trials

Two trials compared interventions tailored to different resident characteristics.[76,77] Both of these trials were conducted by Kolanowski, et al. Studies tested the Needs-Driven, Dementia-

Compromised Behavior model, which posits that activities for individuals with BPSD must fit the physical and cognitive functional abilities and personality of the resident.

Kolanowski, et al (2005) conducted a crossover RCT and randomized 33 dementia residents with agitation/aggression to activity based interventions based on skill level only, style of interest only, or skill level and style of interest. The mean age of study participants was 82.3 years and 77 percent were female. Residents randomized to skill level only received activities appropriate to their abilities but opposite to their personalities. Residents randomized to style of interest only received activities appropriate to their abilities but opposite to their personalities. Finally, residents randomized to skill level and style of interest received activities that were appropriate to both. Within each arm, activities were implemented for up to 20 minutes for 12 consecutive days. Agitation/aggression was measured with the CMAI. Postintervention outcomes were reported at the patient-intervention level. Postintervention CMAI was similar among all groups.[77] No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Kolanowski, et al (2011) evaluated the Needs-Driven, Dementia-Compromised Behavior model in 128 residents from nine community nursing homes.[76] Participants were randomly assigned to activities tailored to functional level (n = 32), activities adjusted to personality style of interest (n = 33), to both (n = 31), or to active control (n = 32), who received activities opposite both their skill level and personality style. The mean age of study participants was 86.11 years and 77 percent were female. The activities were provided twice daily for 3 weeks. Agitation/aggression measured with CMAI decreased in all four groups; mean changes and postintervention means were similar across groups. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

Two studies assessed the effect of interventions tailored to different resident characteristics.[76,77] Low strength evidence shows that interventions tailored to different patient characteristics have a similar effect on managing agitation/aggression in dementia.

Acupuncture

Eligible Trial

Rodriguez-Mansilla et al. randomized 120 nursing home residents from three nursing home and/or assisted living facilities in Spain to massage (n = 40), ear acupuncture (n = 40), or control (n = 40).[72] Details of this study are provided in the massage section. We discuss the massage versus no-treatment arms with the other massage trial, and the acupuncture versus no treatment arms here. The ear acupuncture group received application of Shenmen Muscle relaxant located in the peripheral inferior concha, close to the spleen and liver with adhesive herbal seeds of Wangbuliuxing (Semen Vaccariae Segetalis). The techniques were performed by a qualified acupuncturist. The seeds were placed with adhesive tape, and were replaced with new seeds every 15 days. The intervention lasted for 12 weeks. General behavior was measured with an investigator-designed instrument asking staff about the number of behavior alterations (not defined). General behavior improved more in the intervention groups than the control group at postintervention (3 months) ($P < 0.001$) and were maintained at 2 months after completing the treatment (5 months) ($P < 0.021$). No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence for the effectiveness of this intervention.[72]

Massage Versus Ear Acupuncture

Eligible Trial

Two arms of one trial previously discussed are used to assess the comparative effectiveness of massage versus ear acupuncture on agitation/aggression. Rodriguez-Mansilla et al.'s trial was previously described.[72] General behavior was measured with an investigator-designed instrument asking staff to report the number of behavior alterations (not defined). General behavior improved by a similar amount with either intervention. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence for the comparative effectiveness of these interventions.

Acupressure

Eligible Trial

Lin et al randomized 133 individuals with dementia residing in six Taiwanese nursing home special care units to acupressure (n = 42), structured Montessori-based activities (n = 39), or presence (attention control) (n = 52).[78] The study used a double-blind crossover design. The mean age of study participants was 80.1 years and 26 percent were female. Acupressure was used to treat agitation/aggression using five acupoints (Fengchi, Baihui, Shenmen, Niguan, and Sanyinjiao). Acupuncture sessions were conducted 15 minutes once a day, 6 days a week, for 4 weeks. Sessions consisted of warmup activities (5 minutes) and acupressure to each acupoint for 2 minutes. Montessori-based activities consisted of sensory stimulation (e.g., rhythmic music) and activities associated with daily living (e.g., scooping, pouring, and squeezing). This was done 6 days a week for 4 weeks. Attention control consisted of engaging subjects in conversation and attempting to maintain the subject's attention for 15 minutes. This was done 6 days a week for 4 weeks. Groups were defined by the sequence in which they received the intervention and analysis was at the patient-intervention level. Results were reported by group after all patients received all interventions. Agitation/aggression was measured with the CMAI. Mean differences before crossover were not reported for agitation/aggression or any intermediate, or secondary outcomes, or adverse effects.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provides insufficient evidence for the effectiveness of this intervention.

Reminiscence

Eligible Trial

Ito et al. randomized 60 vascular dementia patients residing in three Japanese nursing home facilities to group reminiscence (n = 20), social contact (n = 20), and a control group (n = 20).[79] The mean age of study participants was similar across all three arms (mean age in group reminiscence in 82.9 years, social contact 81.9 years, and control 82.1 years). In all three groups there were more woman than men. A team of ten professionals from psychology, speech therapy, occupational therapy, social work, and nursing were trained to deliver group reminiscence therapy or social contact. Group reminiscence was delivered to four residents at a time and sessions were delivered 1 hour a week for 3 months. Residents in the social contact group (four residents per session) received a 1 hour session of reality orientation. The social contact group also participated in a protocol-based conversation. The control group received supportive care. General behavior, measured using MOSES Multi-dimensional Observation Scale for Elderly Patients, showed no difference between groups after the intervention. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence regarding the effectiveness of this intervention.

Group Exercise

Eligible Trial

Roland et al. randomized 134 residents with mild to severe dementia to a group exercise program (n = 67) or usual care (n = 67).[80] The mean age of residents in the group exercise program was 82.8 years and 72 percent were female. The mean age of residents in usual care was 83.1 years and 79 percent were female. Residents in group exercise were placed in groups of three to seven by functional abilities so that their exercises could be tailored to their ability (e.g., walking, strength, balance, and flexibility). Sessions were delivered by a physical therapist for 1 hour twice a week for 12 months. Residents in usual care received routine medical care. Agitation/aggression were assessed at 6 and 12 months using the NPI agitation subscale. At 6 and 12 months there was no difference in agitation/aggression between residents in the group exercise program and usual care. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence regarding the effectiveness of this intervention.

Pleasant Experiences

Eligible Trial

Lichtenberg et al. randomized 20 residents from two dementia special care units to individually designed pleasant event one-on-one activity (n = 9) or usual care (n = 11).[81] The mean age of all residents was 85 years and 90 percent of participants were female. The

behavioral treatment was an individually designed pleasant activity delivered by a trained nursing assisted three times a week for 20 to 30 minutes a session for 3 months. Pleasant activities were identified for the residents based on interviews with family caregivers. Repeated measures analysis of variance was used to evaluate treatment effects. No group differences were reported for general behavior as measured using the BEHAVE-AD instrument; both groups improved. A significant group time interaction occurred in favor of the intervention group ($p < 0.001$). No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provides insufficient evidence regarding the effectiveness of this intervention.

Multisensory Intervention Versus Recreational Activities

Eligible Trial

Baker et al. randomized 136 residents or day program participants with dementia in facilities in the United Kingdom, the Netherlands, and Sweden to multisensory stimulation (n = 65) or a group activity (n = 71).[44] The mean age of residents randomized to multisensory was 81 years, and the mean age of residents randomized to group activity was 83 years. The multisensory intervention involved one-to-one staff participant time in the sensory room where participants could experience touch, smell, sound, and sight. Group activities included activities such as playing card games or doing quizzes. Both multisensory and group activity sessions were conducted for 30 minutes twice a week for 4 weeks (a total of eight sessions). Pre-, mid- (after the fourth session), post- (after the final session), and followup assessments (1 month after the final session) were taken. Changes in general behavior measured with several instruments (Behaviour Observation Scale for Intra-mural Psychogeriatrics; BRS; REHAB [general and deviant behavior]; and BMD [total, active/disturbed]) were similar with intervention and control. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provides insufficient evidence regarding the comparative effectiveness of these interventions.

Activities of Daily Living Intervention

Eligible Trial

Beck et al. randomized 127 nursing home residents with dementia and behavioral symptoms to five groups including an activities of daily living intervention (n = 28), a psychosocial activity intervention (n = 29), a combined activities of daily living/psychosocial activities group (n = 22), attention control (n = 29), or usual care (n = 19).[82] Those with severe activity limitations or some psychiatric or medical diagnoses that would restrict participation were excluded. The mean age of all study participants was 82.5 years and 81 percent were female. The interventions were conducted over 2 weeks by project-hired nursing assistants under the supervision of the principal investigator. The goal of the activities of daily living intervention was to reduce agitation/aggression during bathing, grooming, dressing, and eating the noon meal. It was administered 45 to 60 minutes per day during these activities and entails breaking down the

tasks, guiding the person initially, and applying individualized problem solving. The psychosocial activity interventions required caregivers to apply 25 standardized modules to help with communication, self-esteem, and personal identity. The modules lasted up to 30 minutes a day depending on resident tolerance. The combined group had both interventions. The attention control group received a 30-minute interaction with a caregiver each day. General behavior measured using the Disruptive Behavior Scale showed similar effects across groups. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence regarding the effectiveness or comparative effectiveness of these interventions.

Simulated Presence

Eligible Trial

Camberg et al. conducted a crossover RCT and randomized 54 nursing home residents with dementia and agitation/aggresion to simulated family presence, attention control, or usual care.[83] The mean age of study participants was 82.7 years and 77 percent were female. Simulated family presence consisted of an audiotape made by a family member and delivered with a telephone call. Because the residents in the study were impaired in recent memory, the recording was perceived as new each time it was heard. Audiotapes were used at least twice a day Monday–Friday for 17 days over 4 weeks. Attention control consisted of an audio tape recording with readings from the newspaper. Attention control was similar to simulated family presence, but recordings were not personalized. Usual care consisted of routine management of behavioral symptoms (e.g., staff interactions, redirection, or physical restraints). Direct observation showed no difference between groups, but staff observation logs showed a greater reduction in behavioral syptoms after simulated presence. Residents showed 67 percent reduction in agitation/aggression after simulated family presence compared with 46 percent reduction after attention control and 59 percent reduction after usual care. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence regarding the effectiveness of this intervention.

Enhancing Family Visits

Eligible Trial

McCallion et al. randomized 66 dementia residents of five nursing homes to a Family Visit Education Program (n = 32) or usual care (n = 34).[84] The mean age of residents in the intervention (86.44 years) and usual care (85.53 years) were similar. In both the intervention (94 percent) and usual care group (65 percent) there were more females than males. The intervention was a structured 8-week training for family members to make more constructive use of their visits. It consisted of four group sessions with role-playing and teaching, followed by a session where the trainer observed the family member with the resident for 20 to 30 minutes and gave 15 minutes of individualized feedback. Groups varied from four to eight participants. Agitation/aggression was

measured with two versions of the CMAI (CMAI-O based on observations and CMAI-N based on nurse report) and general behavior with MOSES at baseline and 3 and 6 months postintervention. Significant group and time interactions were observed on the physically nonaggressive behavior subscale of the CMAI-N from baseline to 6 months. During this time, physically nonaggressive behavior decreased more for residents in the intervention than for residents in usual care ($p < 0.001$). Significant group and time interactions were also observed from baseline to 3 months for the GIPB verbal behavioral subscale ($p <0.042$). During this time period, verbal behavior increased more for residents in the intervention group than in usual care. Finally, from baseline to 3 months, restraints were used less on residents in the intervention group than those in usual care ($p <0.024$). However, during this same period of time fewer psychotropic drugs were used in residents in usual care than those in the intervention group (0.002). No other intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provided insufficient evidence regarding the effectiveness of this intervention.

Electrostimulation

Eligible Trial

Hozumi et al. randomized 27 nursing home residents with dementia to electrostimulation (n = 14) or sham therapy (n = 13).[85] The age of residents varied between 58 and 86 and 56 percent were female. Electrodes were attached to forehead using a defined amount of current. Placebo participants had the same electrodes but were not connected to a device. Intervention was performed daily for 2 weeks. Behavioral symptoms were evaluated on the last day of the intervention. Different domains of agitation/aggression were assessed with an unknown scale. Intervention and control did not differ for behavioral disorders. No intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provides insufficient evidence regarding the effectiveness of this intervention.

Multisensory Group Intervention

Eligible Trial

Robichaud et al. randomized 40 residents with dementia who resided in three institutions in Quebec City, Quebec, Canada, to a sensory integration program (n = 22) or usual leisure activities (n = 18).[86] Randomization was stratified according to dementia severity. The mean age of residents in the intervention group was 76.6 years and the mean age of residents in the control group was 80.1 years. Sensory integration incorporated reality orientation and movement approaches. Each session included five steps: 1) opening of the session, reality orientation; 2) activities emphasizing bodily responses: gross, proprioceptive, and vestibular movements; 3) sensory stimulations: taste, smell, touch, sight, hearing; 4) cognitive stimulations for organizing thought: memory, concentration, judgment; and 5) closing the session: socialization, pleasure, and relaxation. Subjects in the study group participated in three 45-minute group sessions per week

for 10 weeks. Separate scores were obtained for two scales RMBPC (Revised Memory and Behavior Problem Checklist) (frequency, depression, memory, psychomotor slowness, disruptive behavior) and (reaction, depression, memory, psychomotor slowness, disruptive behavior). Each subject was evaluated at the beginning and end of the intervention program. General behavior measured with RMBPC was similar for intervention and control postintervention. No other intermediate outcomes, secondary outcomes, or adverse effects were reported.

Evidence Synthesis and Strength of Evidence

One trial with study limitations and imprecise estimates provides insufficient evidence regarding the effectiveness of this intervention.

Figure 3. Music therapy versus control (impact of treatment on agitation/aggresion)

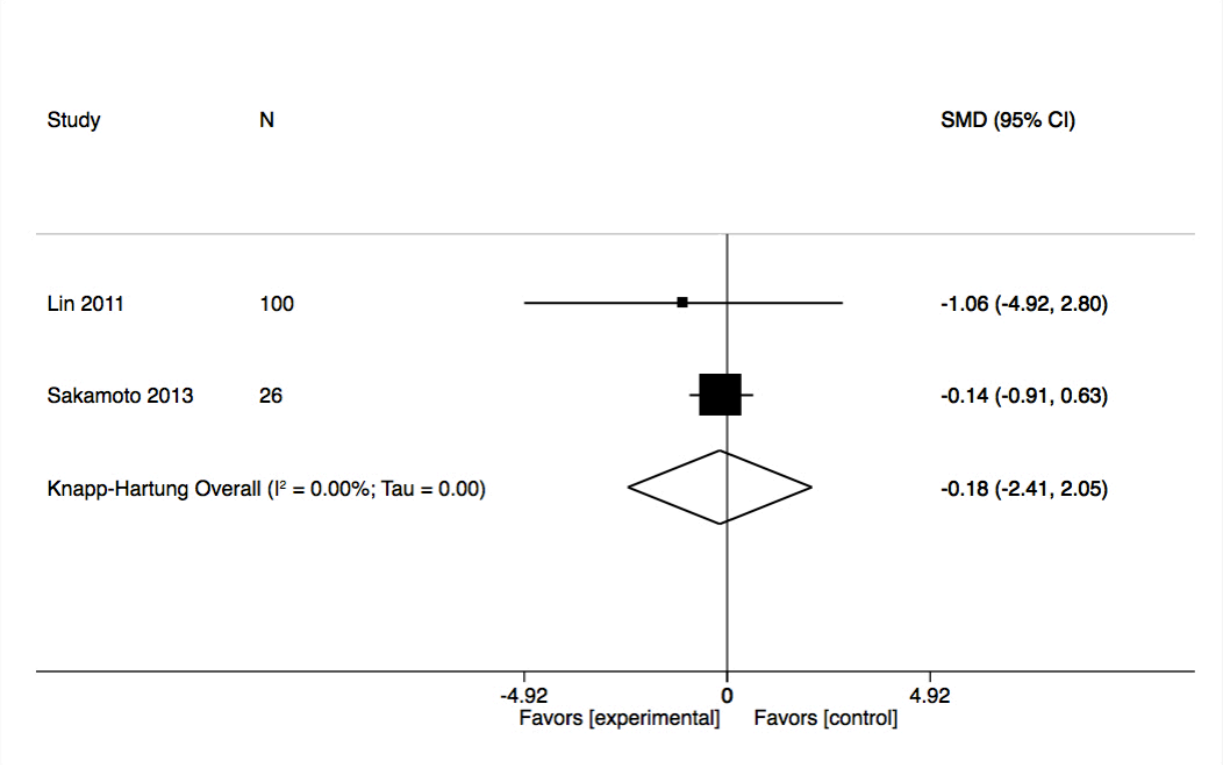


Figure 4. Bright light versus standard light (impact of treatment on agitation/aggression)

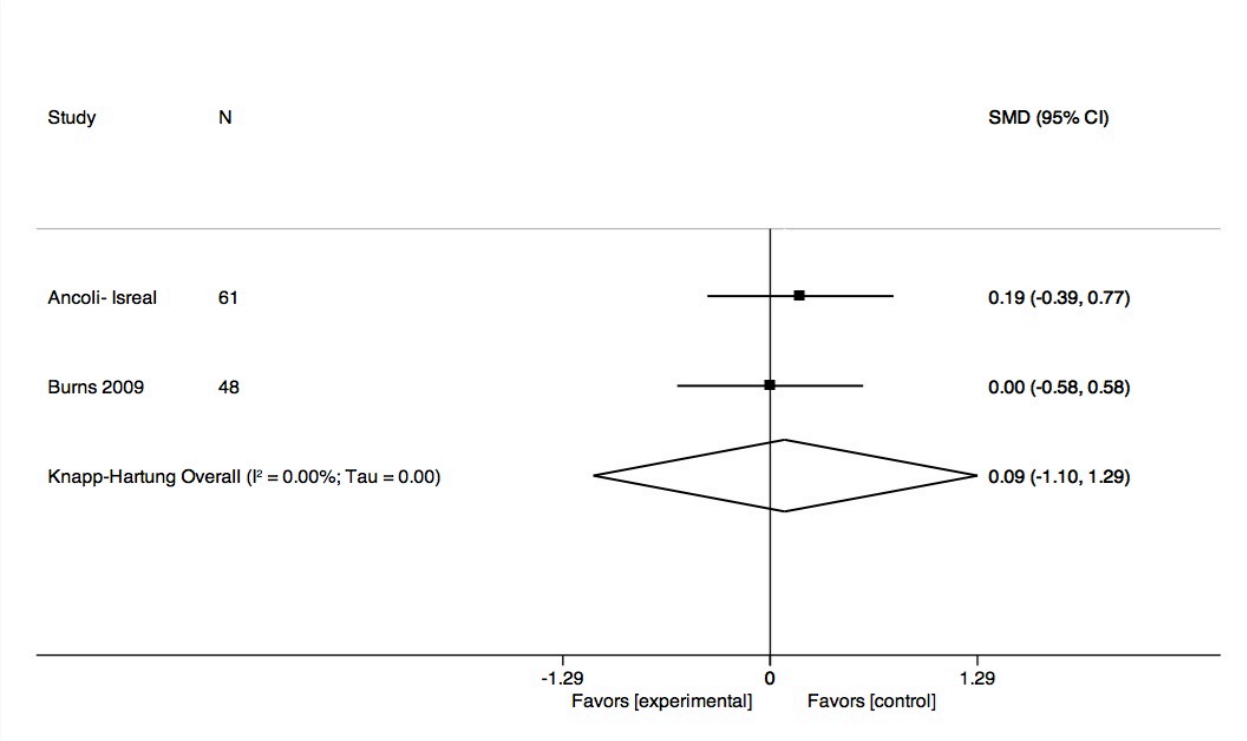


Table 5. Patient-level Interventions for Agitation/Aggression in Nursing Home and Assisted Living Facility Residents with Dementia

Intervention-Comparison	Total Number of Studies (Number of participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Music vs. no treatment/attention control (for sustained reduction in agitation/aggression)	3 (199)	Low – agitation/aggression not improved
Music vs. no treatment/attention control (for immediate reduction in agitation/aggression)	1 (34)	Insufficient – no conclusions drawn
Music vs. Comparison Intervention (for sustained reduction in agitation/aggression)	4 (218)	Low – agitation/aggression not improved
Aroma therapy with Lavender vs. no treatment/attention control	2 (115)	Low – agitation/aggression not improved
Aroma therapy with Melissa vs. no treatment/attention control	1 (72)	Insufficient – no conclusions drawn
Light Therapy vs. no treatment/attention control	4 (225)	Low – agitation/aggression not improved
Therapeutic Touch vs. no treatment/attention control	1 (51)	Insufficient – no conclusions drawn
Massage vs. no treatment/attention control	1 (34)	Insufficient – no conclusions drawn
Tailored Activities vs. Nontailored Activities	3 (247)	Insufficient – no conclusions drawn
Tailored Activities vs. Tailored Activities	2 (158)	Low – agitation/aggression not improved
Acupuncture	No studies reporting	Insufficient – no conclusions drawn
Massage vs. Ear Acupuncture	No studies reporting	Insufficient – no conclusions drawn
Acupressure	1 (133)	Insufficient – no conclusions drawn
Structured Activities	1 (133)	Insufficient – no conclusions drawn
Acupressure vs. Structured Activities	1 (133)	Insufficient – no conclusions drawn
Reminiscence	No studies reporting	Insufficient – no conclusions drawn
Exercise	No studies reporting	Insufficient – no conclusions drawn
Pleasant Experiences	No studies reporting	Insufficient – no conclusions drawn
Multisensory vs. Recreation	No studies reporting	Insufficient – no conclusions drawn
Activities of Daily Living vs. Psychosocial Activity	No studies reporting	Insufficient – no conclusions drawn
Simulated Presence	1 (54)	Insufficient – no conclusions drawn
Enhancing Family Visits	1 (66)	Insufficient – no conclusions drawn
Electro Stimulation	1 (27)	Insufficient – no conclusions drawn
Group Multistimulation vs. Leisure Activities	1 (40)	Insufficient – no conclusions drawn
General Behavior		
Music vs. no treatment/attention control (for sustained reduction in agitation/aggression)	2 (99)	Insufficient – no conclusions drawn
Music vs. no treatment/attention control (for immediate reduction in agitation/aggression)	No Studies Reported	Insufficient – no conclusions drawn
Music vs. Comparison Intervention (for sustained reduction in agitation/aggression)	1 (26)	Insufficient – no conclusions drawn
Aroma therapy with Lavender vs. no treatment/attention control	2 (98)	Insufficient – no conclusions drawn
Aroma therapy with Melissa vs. no treatment/attention control	No Studies Reported	Insufficient – no conclusions drawn
Light Therapy vs. no treatment/attention control	3 (133)	Low – general behavior not improved
Therapeutic Touch vs. no treatment/attention control	2 (108)	Insufficient – no conclusions drawn
Massage vs. no treatment/attention control	1 (71)	Insufficient – no conclusions drawn
Tailored Activities vs. Nontailored Activities	No Studies Reported	Insufficient – no conclusions drawn
Tailored Activities vs. Tailored Activities	No Studies Reported	Insufficient – no conclusions drawn
Acupuncture	1 (76)	Insufficient – no conclusions drawn
Massage vs. Ear Acupuncture	1 (75)	Insufficient – no conclusions drawn
Acupressure	No Studies Reported	Insufficient – no conclusions drawn
Acupressure vs. Structured Activities	No Studies Reported	Insufficient – no conclusions drawn

Intervention-Comparison	Total Number of Studies (Number of participants)	Strength of Evidence - Summary of Results
Reminiscence	1 (40)	Insufficient – no conclusions drawn
Exercise	1 (134)	Insufficient – no conclusions drawn
Pleasant Experiences	1 (20)	Insufficient – no conclusions drawn
Multisensory vs. Recreation	1 (136)	Insufficient – no conclusions drawn
Activities of Daily Living vs. Psychosocial Activity	1 (127)	Insufficient – no conclusions drawn
Simulated Presence	No Studies Reported	Insufficient – no conclusions drawn
Enhancing Family Visits	1 (66)	Insufficient – no conclusions drawn
Electro Stimulation	No Studies Reported	Insufficient – no conclusions drawn
Group Multistimulation vs. Leisure Activities	1 (40)	Insufficient – no conclusions drawn

Note: only one study reported an intermediate outcome; data was insufficient – no conclusions drawn

Table 6. Efficacy and Comparative Effectiveness of Patient-level Interventions for Agitation/Aggression in Nursing Home and Assisted Living Facility Residents with Dementia

Study **Design** **Country** **Comparison** **n** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	**Intermediate Outcome-Instrument Results**	**Primary Outcome-Instrument Results**
Music - Efficacy			
Sakamoto 2013[57] RCT Japan Passive music vs. active music vs. attention control n = 39 Moderate	- Passive music intervention with participants listening to music via CD for 30 minutes once/week for 10 weeks - Interactive music intervention with participants listening to music on CD but also participating in an active activity (clapping, singing, dancing) guided by music facilitator for 30 minutes once/week for 10 weeks - Attention control	**Neuroleptic Use** NR	***Agitation/Aggression*** **Behave-AD Aggressiveness,** mean (SD) Baseline: 1.5 (1.8) vs. 2.5 (2.4) vs. 2.5 (3.1) Post: 1.5 (0.9) vs. 0.7 (1.0) vs. 3.2 (3.0) 3 weeks followup: 1.3 (2.0) vs. 2.5 (2.2) vs. 2.9 (3.1) ***General behavior*** **Behave-AD** Global mean (SD) Baseline: 0.9 (0.5) vs. 1.5 (0.7) vs. 1.3 (0.7) Post: 0.8 (0.4) vs. 0.7 (1.0) vs. 1.5 (0.8) 3 weeks followup: 1.1 (0.5) vs. 1.2 (0.6) vs. 2.2 (0.9)
Lin 2011[58] RCT Taiwan Group music therapy vs. usual care n = 100 Moderate	- Group music therapy intervention - 30-minute sessions twice weekly for 6 weeks (12 total sessions) - Control did usual daily activities	**Neuroleptic Use** NR	***Agitation/Aggression*** **C-CMAI,** mean (SD) Baseline: 43.12 (16.32) vs. 37.78 (11.04) 12^{th} session: 36.37 (10.64) vs. 38.55 (10.27) One month post:35.69 (9.99) vs. 37.75 (9.70)
Raglio 2010[59] RCT Italy Group music therapy vs. usual care n = 60 Moderate	- Group music therapy, three 30-minute sessions per week for one month with alternating washout month for 6 months (36 sessions total) - Usual care control	**Neuroleptic Use** NR	***Agitation/Aggression*** **NPI Agitation Subscale,** mean (SD) Baseline: 3.13 (NR) vs. 3.87 (NR) End of treatment: 1.36 (NR) vs. 3.00 (NR) 4 week followup: 1.57 (NR) vs. 2.92 (NR) ***General behavior*** **NPI:** results presented graphically; authors report lower scores post-intervention ($F_{1,51}$=4.84, p<0.05); difference likely not significant at followup.
Remington 2002[60] RCT United States Calming music vs. no treatment n = 26 (for these two groups) Moderate	- Ten minutes of taped calming music played from a CD player once - No treatment control	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI** mean (SD) Baseline: 18.41 (11.19) vs. 21.76 (9.09) Immediately post: 9.18 (11.11) vs. 21.88 (10.38) 10 min. post: 7.76 (9.55) vs. 20.88 (8.66) 20 min. post: 3.06 (5.44) vs. 20.47 (10.90) Repeated measures analysis of variance across all 4 groups: $F_{3,9}$=6.47; p<.01

Study **Design** **Country** **Comparison** **n** **Study Risk of Bias**	**Intervention Description** **[Intensity, Duration, Qualifications Interventionist]**	**Intermediate Outcome-Instrument Results**	**Primary Outcome-Instrument Results**
Music – Comparative Effectiveness			
Sakamoto 2013[57] RCT Japan Passive music vs. active music n = 26 Moderate	- Passive music intervention with participants listening to music via CD for 30 minutes once/week for 10 weeks - Interactive music intervention with participants listening to music on CD but also participating in an active activity (clapping, singing, dancing) guided by music facilitator for 30 minutes once/week for 10 weeks - No intervention control	**Neuroleptic Use** NR	***Agitation/Aggression*** **Behave-AD Aggressiveness,** mean (SD) Baseline: 1.5 (1.8) vs. 2.5 (2.4) Postintervention: 1.5 (0.9) vs. 0.7 (1.0) 3 weeks followup: 1.3 (2.0) vs. 2.5 (2.2) ***General behavior*** **Behave-AD Global,** mean (SD) Baseline: 0.9 (0.5) vs. 1.5 (0.7) Postintervention: 0.8 (0.4) vs. 0.7 (1.0) 3 weeks followup: 1.1 (0.5) vs. 1.2 (0.6)
Vink 2013[62] RCT The Netherlands Group music therapy vs. recreational activity n=94 Moderate	- Group music therapy with music therapists - Recreational activity control with OTs - 40 minute sessions twice/week for 4 months (max of 34 sessions)	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI** Means– shown in figures; adjusted mean difference NS (F=2.89; p=0.09)
Cooke 2010[61] RCT-Crossover Australia Music-reading vs. reading-music n = 47 Moderate	- Live, somewhat tailored music program with facilitated engagement and song - Control interactive reading intervention with short stories, jokes, and quizzes - 40 minute sessions 3x/week for 8 weeks (total of 24 sessions)	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI-SF,** mean (95% CI) Baseline: 1.66 (1.42-1.91) vs. 1.54 (1.32-1.77) After first arm:1.67 (1.49-1.85) vs. 1.66 (1.37-1.96) ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR
Remington 2002[60] RCT United States Calming music vs. hand massage vs. calming music and hand massage n = 51 (3 arms) Moderate	- Ten minutes of taped calming music played from a CD player once - No treatment control	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI mean** (SD) Baseline: 18.41 (11.19) vs. 16.47 (9.94) vs. 22.00 (11.94) Immediate post: 9.18 (11.11) vs. 10.35 (11.20) vs. 8.59 (7.87) 10 min post: 7.76 (9.55) vs. 7.76 (9.55) vs. 7.06 (7.08) 20 min post: 3.06 (5.44) vs. 3.06 (5.44) vs. 3.76 (4.40)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
Aromatherapy			
Fu 2013[63] RCT Australia Lavender vs placebo water spray n = 45 (in these two arms) Moderate	- Lavender or water treatments were given twice/day (morning and afternoon) 7 days/week for 6 weeks	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI – aggressive behaviors** No overall results reported; no statistically significant difference between groups on individual behaviors reported.
Fujii 2008[64] RCT Japan Lavender aromatherapy vs no treatment n = 28 Moderate	- Lavender aromatherapy applied to clothing of the patients 3 times/day 1 hour after meals for 4 weeks - No treatment control	**Neuroleptic Use** NR	***General Behavior*** **NPI**, mean (SD) Baseline: 31 (10) vs. 32 (11) 4 weeks: 18 (12) vs. 27 (12)
Lin 2007[65] RCT-Crossover Hong Kong Lavender vs sunflower aromatherapy n = 70 Moderate	- Two drops of the treatment or comparison oil were placed on each side of the pillow of the participant during sleep at night for 3 weeks - Participants crossed over to the other treatment after a 2 week wash out period	**Neuroleptic Use** NR	***Agitation/Aggression*** **C-CMAI**, mean (SD) Baseline: 63.17 (17.81) vs. 63.94 (SD 17.67) Post: 58.77 (16.74) vs. 63.90 (17.73) ***General Behavior*** **CNPI**, mean (SD) Baseline: 24.68 (10.54) vs. 24.33 (10.08) Post: 17.77 (7.52) vs. 24.41 (10.24)
Ballard 2002[35] RCT United Kingdom Melissa essential oil vs sunflower oil n = 72 Moderate	- Melissa or sunflower essential oil was combined with a base lotion and applied to patients' faces and arms twice/day for 4 weeks	**Neuroleptic Use** Prescribed additional psychotropic drugs during the study: 6% vs. 8%	***Agitation/Aggression*** **CMAI** Proportion making 30% decrease in score: (60% vs. 14%, χ^2=16.3; p<.0001). **CMAI, median change** -22.0 vs. -6.5 Z=4.1; p<.0001
Light			
Burns 2009[67] RCT United Kingdom Bright light vs standard light n = 48 Moderate	- Bright light included 2 hours of exposure daily over 2 weeks - Standard light included 2 hours of exposure daily over 2 weeks	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI**, mean (SD) Baseline: 62.0 (18.4) vs. 57.5 (13.8) Week 4: 51.8 (22.8) vs. 50.9 (15.6) Week 8: 49.5 (SD 13.8) vs. 49.5 (SD 10.4) ***General Behavior*** **Crichton Royal Behavior Rating**, mean (SD)

Study **Design** **Country** **Comparison** **n** **Study Risk of Bias**	**Intervention Description** **[Intensity, Duration, Qualifications Interventionist]**	**Intermediate Outcome-Instrument** **Results**	**Primary Outcome-Instrument** **Results**
			Baseline: 34.2 (6.5) vs. 35.6 (7.6) Week 4: 41.3 (2.9) vs. 42.8 (1.4) Week 8: 43.8 (3.4) vs. 44.2 (2.5) **MOUSEPAD**, mean (SD) Baseline: 13.5 (11.6) vs. 13.4 (8.8) Week 4: 7.8 (7.9) vs. 7.8 (SD 4.3) Week 8: 8.0 (7.8) vs. 7.7 (3.7)
Dowling 2007[68] RCT United States Morning light vs. afternoon light vs. control n = 70 Moderate	- Morning bright light with activities for one hour per day on Mondays-Fridays for 10 weeks - Afternoon bright light with activities for one hour per day on Mondays-Fridays for 10 weeks - Control group was provided with usual activities	**Neuroleptic Use** NR	***Agitation/Aggression*** **NPI Agitation/aggression**, mean (SD) Baseline: 5.3 (3.5) vs. 3.7 (2.4) vs. 5.8 (3.4) Postintervention mean: 5.5 (3.3) vs. 4.8 (2.6) vs. 4.3 (2.5) ***General Behavior*** **NPI**, mean (SD) Baseline: 29.4 (20.7) vs. 27.0 (15.7) vs. 24.1 (15.8) Postintervention: 26.3 (13.9) vs. 27.5 (16.5) vs. 19.6 (10.8)
Ancoli-Israel 2003[66] RCT United States Morning bright light vs. evening bright light vs. dim light n = 92 Moderate	- Morning bright light was 2 hours of morning bright light exposure for 10 days - Evening bright light was 2 hours of evening exposure for 10 days - Dim light was 2 hours of morning exposure to dim red light for 10 days	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI** Data not provided; text reports no overall difference among treatment groups ($F_{16,453}$=0.99; p=0.46) **ABRS Verbal Agitation-morning, mean (SD)** Baseline: 0.19 (0.53) vs. 0.34 (0.71) vs. 0.18 (0.55) Days 6-10: 0.22 (0.59) vs. 0.20 (0.56) vs. 0.12 (0.47) Followup: 0.12 (0.45) vs. 0.20 (0.53) vs. 0.10 (0.40) ***Agitation-ABRS Verbal Agitation*-evening, mean (SD)** Baseline: 0.23 (0.59) vs. 0.27 (0.63) vs. 0.26 (0.59) Days 6-10: 0.27 (0.64) vs. 0.33 (0.68) vs. 0.16 (0.52) Followup: 0.25 (0.60) vs. 0.29 (0.67) vs. 0.18 (0.53)
Lyketsos 1999[69] RCT-Crossover United States Bright light vs. dim blinking light n = 15 Moderate	- Bright light for 1 hour every morning for 4 weeks, one week of no treatment, then control condition - Control participants had dim, blinking light for 1 hour every morning for 4 weeks, one week of no treatment, then bright light condition	**Neuroleptic Use** NR	***Agitation/Aggression*** **Behave-AD Aggression subscale** No significant differences, did not present data (p>0.05) ***General Behavior*** **Behave-AD, mean (SD)** Baseline: 14.9 (3.83) vs. 13.7 (3.49) Week 4: 12.6 (SD 4.79) vs. 10.7 (4.85)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
Massage			
Remington 2002[60] RCT United States Hand massage vs. no treatment n = 34 (for these two groups) Moderate	- Ten minutes of taped calming music played from a CD player once - No treatment control	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI, mean (SD)** Baseline: 16.47 (9.94) vs. 21.76 (SD 9.09) Post:10.35 (SD 11.20) vs. 21.88 (SD 10.38) 10 min. post: 7.76 (SD 9.55) vs. 20.88 (SD 8.66) 20 min. post: 3.06 (SD 5.44) vs. 20.47 (SD 10.90)
Rodriguez-Mansilla 2013[72] RCT Spain Massage therapy vs. no treatment control n = 71 Moderate	- Massage therapy group received 20 minute back and lower limb massages Monday-Friday for 3 months - Control group received no treatment	**Neuroleptic Use** NR	***General Behavior*** ***Behavior alterations*** 3 months: 34/36 vs. 0/35 5 months: 28/35 vs. 32/36
Therapeutic Touch			
Hawranik 2008[71] RCT Canada Therapeutic touch vs. simulated touch vs. usual care n = 51 Moderate	- Therapeutic touch of one session of 30-40 minutes/day for 5 days - Simulated therapeutic touch of one session of 30-40 minutes/day for 5 days - Usual care had no additional treatment	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI-Physical aggression (# behaviors), mean (SD)** Baseline: 0.94 (0.83) vs. 0.75 (0.77) vs. 0.78 (0.81) Day 5: 0.18 (0.39) vs. 0.13 (0.34) vs. 0.11 (SD 0.32) 2 weeks post: 0.65 (0.70) vs. 0.38 (0.62) vs. 0.28 (0.57) **Agitation – Physical nonaggression (# behaviors), mean (SD)** Baseline: 1.4 (0.71) vs. 1.18 (0.83) vs. 1.39 (1.1) Day 5: 0.29 (0.69) vs. 0.25 (0.45) vs. 0.67 (0.91) 2 weeks post: 1.24 (0.83) vs. 0.63 (0.81) vs. 0.83 (0.79) **Agitation – Verbal agitation(# behaviors), mean (SD)** Baseline: 1.88 (1.45) vs. 1.69 (1.25) vs. 2.33 (1.53) Day 5: 0.35 (0.70) vs. 0.38 (0.89) vs. 0.89 (0.96) 2 weeks post: 0.88 (0.86) vs. 1.50 (1.59) vs. 01.33 (1.24)
Woods 2005[70] RCT United States	- Therapeutic or placebo therapeutic touch was delivered twice daily for 5-7 minutes each session for 3 days	**Neuroleptic Use** NR	***General Behavior*** **Modified ABRS, mean (SD)** Baseline: 1.55 (1.03) vs. 1.64 (1.87) vs. 1.53 (0.99)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
Therapeutic touch vs. placebo therapeutic touch vs. usual care n = 57 Moderate			Post: 1.03 (0.67) vs. 1.24 (1.26) vs. 1.48 (1.12)
Tailored vs. Nontailored Activity			
Van der Ploeg 2013[75] RCT – Crossover Australia Montessori activities vs. nonpersonalized activity n=44 Moderate	- Montessori group had personalized one-on-one interactions using Montessori based activities performed by family members. - Control condition got nonpersonalized activity. - Study period of 4 weeks—30 minute sessions twice weekly. - Cross-over occurred after 2 weeks	**Neuroleptic use** NR	***Agitation/Aggression*** Target behavior present per minute, mean (SD) Baseline: 16.7 (9.9) vs. 17.1 (9.8) During intervention: 8.4 (9.9) vs.10.0 (10.4) After intervention: 17.6 (10.3) vs. 17.0 (9.4)
Cohen-Mansfield 2012[73] RCT United States TREA vs. Staff Training n=125 Moderate	TREA (Treatment Routes for Exploring Agitation) – involves: - Baseline assessment, hypothesizing unmet needs; intervention designed to meet needs based on resident needs, interests, and preferences. - Elaborate approach and multiple sources to hypothesize and address the unmet needs in various categories. - The placebo group got staff training on behavior only.	**Neuroleptic use** NR	***Agitation/Aggression*** **ABMI, mean (SD)** Baseline: 8.76 (5.61)vs. 7.16 (7.61) Post: 2.08 (2.68) vs. 7.92 (9.09) 2-way repeated measures ANCOVA shows reduction larger with TREA
Kovach 2004[74] RCT United States BACE vs. Control n=78 Moderate	- The BACE (Balancing Arousal Controls Excesses) intervention controls the daily activity schedule so that there is a balance between the time a person is in a high-arousal and a low-arousal state. - Consists of 3 phases: Phase 1 is to make an assessment; Phase 2 is to diagnose and plan a correction of the arousal imbalance; phase 3 is to implement a new activity schedule. - No information on control group.	**Neuroleptic use** NR	***Agitation/Aggression*** **Visual Analog Scale (0 to 100 based upon observation), mean (SD)** Baseline: 38.97 (20.54) vs. 32.59 (21.66) Posttest mean(SD): 30.54 (15.31) vs. 32.25(20.16) (Pretest to Posttest * group: $F_{1,69}$=4.26; p=0.43)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
Tailored Activities vs. Tailored Activities			
Kolanowski 2011[76] RCT United States Functional level vs. personality style of interest vs. both vs. active control n=128 Moderate	Tailored activities: - Functional group- activities tailored to skill level but opposite their PSI. - Personality group - activities tailored to be functionally challenging for them. - Functional & Personality group-activities tailored to skill level and functionally challenging. - Active group - activities that were functionally challenging and opposite their personality. Participants received their assigned activity for up to 20 minutes twice per day (morning and afternoon) 5 days each week for 3 consecutive weeks.	**Neuroleptic use** NR	***Agitation/Aggression*** ***CMAI,*** Least Square means (95% CI): Baseline: 1.62 (0.9-2.4) vs. 2.46 (1.7-3.2) vs. 1.86 (1.1-2.6) vs. 1.88 (1.1-2.6) Post: 1.2 (0.3-2.0) vs.1.7 (0.9-2.5) vs.1.5 (0.6-2.3) vs.1.10 (0.3-1.9)
Kolanowski 2005[77] RCT – Crossover United States Skill based vs. Interest based vs. Skill and Interest based n=30 Moderate	Tailored activities: - Treatment A-activities matched to skill level only - Treatment B-activities matched to style of interest only - Treatment C- combination of both. Each activity lasted for up to 20 minutes per day for 12 consecutive days, with a 2-day washout period between treatments.	**Neuroleptic use** NR	***Agitation/Aggression*** ***CMAI, mean (***CI***)*** Baseline: 2.85 (2.0-3.7) Post: 1.35 (0.5-2.2) vs. 1.09 (0.3-1.9) vs. 1.14 (0.3-4.0)
Unique Comparisons			
Rodriguez-Mansilla 2013[72] RCT Spain Massage therapy vs. ear acupuncture n = 75 Moderate	- Ear acupuncture with adhesive herbal seeds, herbal seeds changed out every 15 days - Massage therapy group received 20 minute back and lower limb massages Monday-Friday for 3 months - Control group received no treatment	**Neuroleptic Use** NR	***General Behavior*** ***Behavior alterations*** 3 months: 34/36 vs. 3/405 months: 28/35 vs. 33/40
Lin 2009[78] RCT - Crossover Taiwan Acupressure-presence-Montessori methods vs. Montessori methods-acupressure-presence vs	- Each treatment was received once/day 6 days/week for 4 weeks, and between each intervention period, there was 1 week of post testing, 2 weeks of washout, and 1 week of pretesting before the next intervention - Acupressure was applied to the hands in 15 minute sessions	**Neuroleptic Use** NR	***Agitation/Aggression*** **CMAI** Presence: Reference group Acupressure: beta -2.113 (SE 0.609) Montessori: beta -2.318 (SE 0.610)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
presence- Montessori methods-acupressure n = 133 Moderate	- Presence consisted of companionship and conversation in 15 minute sessions - Montessori methods included 45 minute sessions of sensory stimulation, demonstration, extension and conclusion for the following tasks: scooping, pouring, squeezing, fine motor skills, environmental care, and personal care		
Ito 2007[79] Japan RCT Group reminiscence (GR) vs. Social contact (SC) vs. Control n=60 Moderate	- Group reminiscence approach and reality orientation was given once a week for 3 months to the subjects in the GR arm. - In the SC arm, a 1-hour session of reality orientation and conversation between participants took place in the same manner. - The control arm had only supportive care.	**Neuroleptic use** NR	***General behavior*** **MOSES, mean (SD)** Baseline: 78.8 (20.8) vs. ±76.6 (22.2) vs. 75.9 (17.1) Post:78.1 (26.0) vs. 75.1 (16.6) vs. 75.9 (19.0)
Rolland 2007[80] RCT France Exercise vs. usual care n = 134 Moderate	- The group exercise intervention consisted of aerobic, strength, flexibility, and balance training twice weekly for 1 hour per session for 12 months (88 sessions total proposed to each subject) - Usual care group received routine medical care	**Neuroleptic Use** NR	***General Behavior*** **NPI, mean (SD)** Baseline: 10.7 (6.9) vs. 11.4 (7.7) 6 months: 8.2 (SD 8.0) vs. 9.2 (8.3) 12 months: 8.3 (SD 8.9) vs. 8.9 (10.4) ***AEs*** There were no significant group differences during the 12 months between the exercise program group and the routine medical care group in observed total number of falls (139 vs. 136), fractures (5 vs. 2), or deaths (7 vs. 8).
Lichtenberg 2005[81] RCT United States Pleasant events vs. usual care n = 20 Moderate	- Trained nursing assistant delivered intervention 3 times per week for 20 to 30 minutes.	**Neuroleptic use** NR	***General Behavior*** **BEHAVE-AD , mean (SD)** Baseline: 1.9 (0.69) vs. 1.4 (0.78) Postintervention: 1.3 (SD 0.30) vs. 2.2 (0.32)
Baker 2003[44] RCT United Kingdom, Netherlands, and Sweden. Multisensory stimulation (MSS) vs. Control	- The key elements of MSS were to place emphasis on all the senses (except taste). - Light and sound effects were used, as well as materials for touching and smelling. - Light effects included bubble tubes, fiber-optic sprays, and moving shapes beamed across the	**Neuroleptic use** NR	***General behavior*** **BRS,** mean(SD) *UK:* (n=492) Baseline: 15.8 (4.6) vs. 16.8 (5.1) Post-trial: 16.8 (4.8) vs. 17.6 (5.6) *NETHERLANDS:*

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
n=136 Moderate NOTE: Because of low numbers in Sweden (only three participants in the MSS group), ANOVAS were carried out on UK and Netherlands data only.	walls. - Sound effects included 'new age' or pseudo-classical music, which did not distract individuals from exploring other stimuli as familiar music would. - Tactile stimulation used satin, cotton wool, shells, etc. Tactile boards made up, used different textures such as rough/smooth, warm/cold, and hard/soft. - Sense of smell was stimulated using aromatherapy and lavender bags, etc. - Patients participated in eight 30-minute sessions over 4 weeks. The control group engaged in activities like playing card, games, looking at photographs, doing quizzes, etc.		Baseline: 16 (5.5) vs. 19.6 (6.4) Post-trial: 17 (5.6) vs. 20.4 (3.7) **REHAB,** mean SD) *UK* (n=87) Baseline: 50.1 (30.0) vs. 55.3 (25.9) Mid-trial:49.7 (29.5) vs. 55.4 (25.5) Post-trial: 49.9 (29.3) vs. 58.6 (27.0) Followup: 54.2 (30.0) vs. 61.3 (28.2) **BMD (total score), mean (SD)** *UK* (n=83) Baseline: 56.4 (13.4) vs. 55.9 (16.6) Mid-trial:52.6 (14.4) vs. 55.1 (19.4) Post-trial: 53.4 (13.9) vs. 55.2 (19.7) Followup: 55.3 (16.4) vs. 55.5 (18.2) **GIP (total score), mean (SD)** *NETHERLANDS ONLY* (n=26) Baseline: : 44.6 (10.1) vs. 53.6 (11.4) Post-trial: 46.2 (12.5) vs. 56.3 (12.6) Followup: 48.2 (13.6) vs. 59.6 (10.8)
Beck 2002[82] RCT United States Activities of daily living intervention vs. psychosocial activity intervention vs. ADL and PSA combined intervention vs. placebo vs. no intervention n = 127 Moderate	- For each intervention, 12 weeks of intervention (first 3 weeks considered baseline, 7 weeks of intervention, and 2 weeks of post-intervention) - ADL intervention: 45-60 minutes per day, PNAs used this intervention during bathing, grooming, dressing, and the noon meal, using strategies to complete an ADL by addressing specific cognitive deficits, using standard strategies of behaviors and communications techniques, and problem-oriented strategies to address particular disabilities - PSA intervention: 25 standardized yet tailored modules containing 5 psychosocial content areas and five sensory modalities, 15-30+ minutes per day - Combined intervention: 90+ minutes per day consisting of both the ADL and the PSA interventions - Placebo control: One on one interaction with PNA doing activities that the participant chose, 30	**Neuroleptic Use** NR	***Agitation/Aggression*** **DBS Physically Aggressive, mean (SD)** Baseline: 20.67 (30.52) vs. 85.87 (199.01) vs. 68.84 (126.18) vs. 49.26 (90.24) vs. 114.66 (202.89) Postintervention: 15.02 (26.10) vs. 82.82 (166.93) vs. 61.04 (127.78) vs. 59.67 (106.37) vs. 77.98 (173.15) 1 month followup: 44.18 (100.62) vs. 113.49 (235.71) vs. 92.68 (205.52) vs. 76.79 (165.45) vs. 130.92 (257.12) 2 month followup: 21.45 (SD 36.47) vs. 81.30 (SD 151.85) vs. 60.40 (SD 131.54) vs. 48.25 (SD 101.34) vs. 128.20 (SD 195.67) **DBS Physically nonaggressive, mean (SD)** Baseline: 95.50 (105.28) vs. 162.41 (206.65) vs. 136.67 (189.03) vs. 167.01 (177.80) vs. 191.97 (157.75) Postintervention: 85.04 (89.60) vs. 133.92 (145.97) vs. 125.99 (157.78) vs. 175.36 (189.80) vs. 118.23 (137.08)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
	minutes/day - No intervention control: Usual care with no scheduled contact with the PNA		1 month followup: 88.81 (85.69) vs. 141.47 (188.99) vs. 159.97 (202.75) vs. 201.68 (212.06) vs. 154.46 (225.05) 2 month followup: 148.75 (187.28) vs. 164.92 (SD) vs. 146.53 (201.82) vs. 87.67 (127.38) vs. 100.45 (153.30) **DBS Vocally aggressive, mean (SD)** Baseline: 22.85 (32.10) vs. 49.64 (93.15) vs. 34.49 (55.91) vs. 47.20 (79.70) vs. 55.16 (74.70) Postintervention: 21.15 (26.54) vs. 37.90 (53.43) vs. 31.18 (33.85) vs. 32.69 (55.77) vs. 33.26 (47.06) 1 month followup: 30.72 (48.95) vs. 54.47 (90.33) vs. 36.95 (42.70) vs. 29.30 (47.60) vs. 64.72 (77.89) 2 month followup: 18.28 (24.55) vs. 40.26 (45.26) vs. 32.82 (51.32) vs. 30.18 (52.85) vs. 28.09 (37.02) **DBS Vocally agitated, mean (SD)** Baseline: 33.49 (84.39) vs. 46.92 (98.70) vs. 62.49 (98.97) vs. 50.10 (92.05) vs. 47.65 (97.22) Postintervention: 43.17 (72.10) vs. 52.50 (90.78) vs. 69.08 (107.29) vs. 48.59 (72.20) vs. 68.01 (116.62) 1 month followup: 43.48 (64.39) vs. 68.22 (98.89) vs. 82.14 (118.97) vs. 63.74 (95.30) vs. 84.50 (112.48) 2 month followup: 50.53 (117.95) vs. 48.89 (92.33) vs. 75.80 (129.67) vs. 54.11 (80.61) vs. 73.07 (117.12) ***General Behavior*** **DBS Total, mean (SD)** Baseline: 172.51 (191.47) vs. 348.02 (467.50) vs. 287.66 (373.73) vs. 325.96 (337.14) vs. 408.71 (427.24) Postintervention: 164.56 (154.95) vs. 303.24 (367.54) vs. 286.21 (365.78) vs. 336.80 (366.55) vs. 281.97 (410.85) 1 month followup: 207.22 (205.58) vs. 373.17 (533.05) vs. 374.10 (510.10) vs. 389.92 (434.43) vs. 418.31 (630.58) 2 month followup: 190.70 (291.06) vs. 300.20 (366.42) vs. 312.83 (433.18) vs. 319.15 (384.59) vs. 292.85 (405.15)

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
Family Involvement in Care or Activity			
Camberg 1999[83] RCT - Crossover New England Simpres vs. Placebo vs. Usual care N=54 Moderate	- Best loved memories of the dementia residents identified through assessment process and introduced to patient in a telephone conversation format using a continuous play audio tape system. - The Simpres audio tape was designed as a personalized interactive tape made by a family member. - The Placebo audio tape was a recording of a person reading emotionally neutral newspaper. - Usual care included the routine interventions nursing home staff used for behavior management e.g., staff interactions, redirection, or physical restraints. - 17 days of treatment and a 10-day washout period following each treatment.	**Neuroleptic use** NR	***Agitation/Aggression*** **SCMAI** Total frequency of agitated behaviors under each treatment condition (no SDs reported): Simpres: 25.5 vs. 27.1 vs. 25.1
McCallion 1999[84] RCT United States Family Involvement vs. Usual care (UC) n=66 Moderate	- FVEP (Family Visit Education Program) was aimed at improving the quality of interaction between family members and nursing home residents. - Intervention was delivered over 8 weeks and included four 1.5-hour group sessions and three 1-hour family conferences. - The trainer observed the family member and resident interacting for 20 to 30 minutes and then provided an additional 15 minutes of feedback about the observations in a family meeting room (after the family member had completed his/her visit). - Participants in the UC condition continued to engage in the usual social and recreational programming offered by each nursing facility.	**Neuroleptic use** NR	***Agitation/Aggression*** **CMAI- Physically aggressive, observant, mean (SD)** Baseline: 0.0 (0.0) vs. 0.0 (0.0) 3-month: 0.3 (1.5) vs. 0.0 (0.0) 6-month: 0.0 (0.2) vs. 0.0 (0.0) **CMAI- Physically nonaggressive, observant, mean (SD)** Baseline: 0.5 (1.4) vs. 0.3 (1.2) 3-month: 1.4 (4.4) vs. 1.1 (6.0) 6-month: 0.2 (0.5) vs. 0.3 (1.9) **CMAI- verbally agitated, observant, mean (SD)** Baseline: 1.7 (3.2) vs. 0.5 (1.2) 3-month: 1.9 (3.8) vs. 0.9 (2.0) 6-month: 0.5 (1.2) vs. 0.8 (2.8) **CMAI- Physically aggressive, nurse, mean (SD)** Baseline: 12.5 (7.1) vs. 10.6 (4.6) 3-month: 11.7 (6.1) vs. 9.7 (3.2) 6-month: 12.1 (6.9) vs. 10.1 (3.6) **CMAI- Physically nonaggressive, nurse, mean (SD)**

Study Design Country Comparison n Study Risk of Bias	Intervention Description [Intensity, Duration, Qualifications Interventionist]	Intermediate Outcome-Instrument Results	Primary Outcome-Instrument Results
			Baseline: 14.3 (7.6) vs. 10.6 (5.6) 3-month: 12.5 (7.2) vs. 10.6 (5.2) 6-month: 11.4 (7.4) vs. 12.9 (6.2) **CMAI- verbally agitated, nurse, mean (SD)** Baseline: 10.6 (9.6) vs. 11.6 (7.7) 3-month: 13.9 (8.6) vs. 10.6 (7.5) 6-month: 12.7 (7.1) vs. 10.7 (7.0
Hozumi 1996[85] Japan RCT Electro-stimulation vs. Placebo n=27 Moderate	- Electro stimulation group had electrodes attached to forehead. - The device (HESS-100) delivered repetitive rectangular electric pulses of 6-8V at increasing frequencies from 6 to 80 Hz, each pulse lasting 0.2ms. - Electro-stimulation was performed for 20 minutes each morning. - Placebo had same electrodes but they were disconnected to actual device	**Neuroleptic use** NR	***Agitation/Aggression*** **Behavior Disorder - Unknown scale, mean (SD)** Baseline: 1.20 (1.21) vs. 1.32 (1.23) 2 weeks post: 0.95 (1.03) vs. 0.98 (1.13)
Robichaud 1994[86] RCT Canada Sensory integration vs. Usual care control n = 40 Moderate	- Sensory integration intervention occurred 3 times/week for 10 weeks and included a 30-45 minute session of structured activities with various materials - Control received usual activities	**Neuroleptic Use** NR	***General Behavior*** **RMBPC, Frequency, mean (SD)** Baseline: 1.43 (0.64) vs. 1.11 (0.46) Postintervention: 1.16 (SD 0.43) vs. 1.04 (0.37) **RMBPC – Disruptive Behavior, mean (SD)** Baseline: 0.91 (0.65) vs. 0.61 (SD 0.38) Postintervention: 0.54 (0.44) vs. 0.49 (0.37) ***Caregiver Distress*** **RMBPC – Reaction, mean (SD)** Baseline: 1.97 (0.87) vs. 1.45 (0.79) Postintervention: 1.21 (0.58) vs. 1.10 (0.60)

ABID=Agitated Behavior in Dementia; BEHAVE-AD=Behavioral Pathology in Alzheimer's disease; BMD=Behavior and Mood Disturbance; BRSD=Behavior Rating Scale for Dementia; MBPC=Memory and Behavior Problem Checklist; MOSES=Multi-dimensional Observation Scale for Elderly Patients; NPI=Neuropsychiatric Inventory; REHAB=Rehabilitation Evaluation Hall and Baker; RMBPC=Revised Memory and Behavior Problem Checklist

Care Delivery-Level Nonpharmacologic Interventions for Agitation/Aggression in Individuals With Dementia in Long-term Care Settings

Key Points

- Few trials studied comparisons and outcomes sufficiently similar to allow pooling data.
- Low strength evidence shows that dementia care mapping and person-centered care did not improve agitation/aggression in residents with dementia.

Overview

We identified 23 eligible trials that assessed care delivery-level nonpharmacologic interventions for agitation/aggression in residents of nursing homes and assisted living facilities. Of these, six were assessed as having a high risk of bias. These studies are described in Appendix D. Our analysis of the remaining 17 trials is provided below by intervention type. Trials with acceptable risk of bias examined a wide variety of care delivery interventions including dementia care mapping, patient-centered care, emotion oriented care, and a variety of staff trainings, and environmental changes to assist way-finding. We grouped studies by intervention type and comparison. All studies were trials but they differed in the unit of randomization (i.e., at nursing home level, staff, or residents). Table 7 provides a summary of the results by intervention type and comparison. Table 8 provides results for trials analyzed.

Dementia Care Mapping

Eligible Trials

Three studies evaluated dementia care mapping (DCM) in nursing homes using cluster randomized designs.[87-89] DCM is a systematic approach to identifying and strategically responding to presumed causes of agitation/aggression and distress. The DCM process consists of observing care, the environment, and factors associated with resident wellbeing as identified by behavioral indicators, and then identifying positive and negative aspects of care delivery. Feedback is given to nursing home staff and used to inform action plans. In some cases, the intervention was conducted by both the trained staff and outside experts. The three studies that evaluated DCM ranged in size from 180 to 308.[87-89] Studies were similar in terms of resident characteristics with mean age of residents varying from 83 to 85 years and most were female. Two studies reported different characteristics of nursing facilities with the number of residents to staff ranging from 0.73 to 3.6.[87,88] Only one study reported care staff characteristics.[89]

Chenoweth et al. compared DCM (n = 109) with person-centered care (PCC) (n = 98) and usual care (n = 82) over a 4-month period.[87] Results for the PCC arm of the trial are presented in the PCC section. Nursing homes were randomized to treatment conditions, and dementia residents with need driven behavioral problems were invited by management and staff to participate in the study. Nursing homes in the DCM group had 52 beds, and 0.73 residents per staff member. Nursing homes randomized to usual care had 53 beds and 0.86 residents per staff member. The mean age of residents randomized to DCM was 83 years and most were female (83 percent). Mean age of patients in usual care was 85 years and 73 percent were female. In each intervention nursing home, two trained study investigators led DCM along with two care staff

trained by a Bradford-trained expert in DCM. Study investigators and care staff conducted DCM for 6 hours over 2 days and then developed personalized care plans. Study investigators conferred with staff via regular teleconferences. Usual care consisted of normal practice of custodial and physical task oriented practices. Hierarchical linear models were estimated to test for treatment effects. With DCM, agitation/aggression declined compared with usual care as measured by the CMAI. At followup (4 months from end of intervention) CMAI score differed by 10.9 points (95% CI, 0.7 to 21.1) in favor of DCM compared with usual care. This represents a 5 percent improvement for patients in DCM relative to usual care and is unlikely to be clinically meaningful. There was no significant group or time by group interaction for general behavior as measured by the NPI, and DCM did not differ significantly from usual care for incidents (falls, injuries, drug errors, and behavioral events), and use of antipsychotic drugs.[87] This study had a low risk of bias.

Rokstad et al. compared DCM (n = 158), PCC (n = 138), with usual care (n = 150) over a 10-month period.[88] Results for the PCC arm of the trial are presented in the PCC section. DCM was used as a process tool to help staff deliver person-centered care. Nursing homes were randomized to treatment conditions. All residents with dementia were invited to participate in the study. On average nursing homes had 24.1 residents per ward and 3.6 patients per staff member. The mean age of all residents was 85.7 years and 71.8 percent were female. Two staff members from nursing homes randomized to DCM participated in a detailed training course. All other staff randomized to DCM participated in a 3-hour lecture on DCM principles. The two trained staff members and study investigators then carried out DCM. Each DCM session consisted of 4 to 6 hours of observation per person with dementia. Following observations of staff and patient interactions, staff participated in feedback sessions with the care mappers. Observation and feedback sessions were held during the beginning of the study and again at 6 months. Nursing home staff randomized to DCM, PCC, and the control group received five DVDs with lectures about dementia. Other than the educational DVDs the control group did not receive any additional training. Linear mixed-models were estimated to test for treatment effects. Compared with the control group, patients cared for by staff in the DCM (-2.0 95% CI, -5.1 to 1.1) showed less agitation/aggression at followup on the Brief Agitation Rating Scale, but this was not significant. However, again compared with the control group, patients cared for by staff assigned to DCM experienced significant reductions on the overall NPI-Q (DCM -2.7 95% CI, -4.6 to -0.7) and the NPI-Q agitation subscale (DCM -0.9 95% CI, -1.7 to -0.04).[88] Although statistically significant, the difference may not be clinically meaningful.[38] This study had a moderate risk of bias due to possible selection bias (unbalanced on key baseline covariates) and high attrition.

A study by van de Ven et al. attempted to replicate the DCM component of the study by Chenoweth et al.[87,89] Nursing homes were randomized to DCM (resident n = 73) or usual care (resident n = 119). Managers in each home selected staff members to participate in the intervention. Residents were invited to participate in the study if they had dementia and at least one behavioral symptom. Residents lost to attrition were replaced. The mean age of residents in DCM (84.6 years) and usual care (83.5 years) was similar and in both groups most residents were female. The mean age of care staff in DCM (43.6 years) and usual care (42.6 years) was similar, and in both homes 98 percent of care staff were female. Two staff members from each intervention nursing home participated in a basic and advanced DCM training program. All staff members in intervention nursing homes attended a seminar on the goals and methods of DCM. Staff trained in DCM conducted at least two cycles of mapping (observation, feedback, and action plans) over a 4-month period. Residents in usual care received the continuation of daily

care practices. Linear-mixed effect models were used to evaluate treatment effects. DCM had no significant effect on patient agitation/aggression (CMAI mean difference in favor of usual care 2.4 95% CI, -2.7 to 7.6). There was a significant interaction effect between group and time in favor of the control group on the NPI-NH scale ($p = 0.022$), but there was no difference in mean score at followup. In terms of staff outcomes, there was no significant group by time interaction in GHQ-12 scores ($p = 0.432$), or MJSS-HC ($p = 0.069$). This study had a moderate risk of bias due to possible selection bias (unclear methods of randomization) and high attrition.

Evidence Synthesis and Strength of Evidence Assessment

All eligible dementia care mapping studies assessed agitation/aggression. Chenoweth et al. was the only study to report an effect in favor of DCM on the primary measure of agitation/aggresssion. Rokstad et al. reported a significant improvement for DCM on a secondary outcome measure of agitation/aggression. However, both of these effects are small and unlikely to be clinically meaningful.[87,88] Both Chenoweth et al. and van de Ven et al. used the CMAI to evaluate agitation/aggression. Rokstad et al. evaluated agitation/aggression using the Brief Agitation Rating Scale, an instrument derived from the CMAI. The secondary outcome measure used by Rokstad et al. was the NPI-Q agitation subscale. To pool results, we standardized the mean between treatment group differences in the primary measure of agitation/aggression from each study. Figure 5 shows the pooled results of the three dementia care mapping studies. Low strength evidence shows that the effect of dementia care mapping on agitation/aggression in dementia is similar to control (standardized mean difference -0.12 95% CI, -0.66 to 0.42). The meta-analysis model had an I^2 of 53 percent and Tau of 0.15. In a subsequent analysis we standardized the CMAI with the NPI-Q agitation subscale and again found similar effects with dementia care mapping and control.

Evidence for all other outcomes was insufficient. All three studies reported general behavior using a version of the NPI (e.g., NPI-Q and NPI-NH).[87-89] Only Rokstad et al. reported significant improvements in general behavior for the intervention group. Chenoweth reported no effect and van de Ven et al reported a significant effect favoring the control. Studies varied on reporting of other outcomes of intermediate and secondary outcomes. Chenoweth et al. reported a null effect for dementia care mapping on neuroleptic use and injuries. This was the only study to report on neuroleptic use or injuries. None of the studies reported adverse events. Finally, van de Ven reported null effects of DCM on staff behavior and general health. This was the only study to evaluate staff outcomes.

Person-Centered Care

Eligible Trials

Three studies evaluated person-centered care interventions using cluster randomized designs.[87,88,90] PCC aims to foster personhood (e.g., positive relationships with others) as dementia progresses. It involves observations and feedback but involves less effort to identify underlying causes of behaviors than DCM. Three studies ranged in size from 141 to 346.[87,88,90] Studies were similar in terms of resident characteristics with the mean age of residents varying from 82 to 85 years. Two studies reported different characteristics of nursing facilities with the number of residents to staff ranging from 0.73 to 3.6.[87,88]

Chenoweth et al. compared PCC with usual care over a 4-month period. The study design is described in the DCM section above. The mean age of residents in PCC was 84 years and 74

percent were female. The number of beds in nursing homes randomized to PCC was 47 and there were 0.92 residents per staff member. Staff members in nursing homes randomized to PCC participated in a 2-day training session focused on interpreting behaviors as a form of communication. Sessions also highlighted techniques to develop care plans for residents. During the intervention period, staff discussed care plans with trainers. Hierarchical linear models were estimated to test for treatment effects. Compared with patients cared for by staff randomized to usual care, patients cared for by staff randomized to PCC had significantly less agitation/aggression at 4 months after the intervention (mean difference in CMAI score 13.6 points 95% CI, 3.30 to 23.9). This represents a 7 percent improvement for patients in PCC relative to usual care and is unlikely to be clinically meaningful. The NPI also showed a significant time trend favoring PCC ($p = 0.04$). However, the group and group by time interaction were not significant. There was no significant difference between PCC and usual care on incidents (falls, injuries, drug errors, and behavioral events) and antipsychotic drugs. This study had a low risk of bias.

Rokstad et al. compared PCC with usual care over a 10-month period. The study design is described in the DCM section above. PCC was based on the VIPS framework (described as [V]aluing people with dementia, [I]ndividualized care, understanding the world from the [P]atient's perspective, and providing a social environment that supports the needs of patient[S]). The VIPS framework consists of 24 indicators used to ensure person-centered care. A staff nurse that participated in a 3-day training in the VIPS method led weekly 60-minute meetings during which the VIPS framework was used to evaluate a challenging patient-staff interaction. PCC and the control group received five DVDs with lectures about dementia. Other than the DVDs the control group consists of usual practice. Linear mixed-models were estimated to test for treatment effects. Compared with the control group, patients in the PCC group (-1.1 95% CI, -3.8 to 1.6) showed a nonsignificant reduction in agitation/aggression measured using the Brief Agitation Rating Scale. However, patients in PCC had statistically significant reductions on the NPI-Q (mean difference -2.4; 95% CI: -4.1 to -0.6) and the NPI-Q agitation sub scale (mean difference -0.9; 95% CI: -1.6 to -0.1). However, these reductions may not be clinically meaningful. This study had a moderate risk of bias due to possible selection bias (unbalanced on key baseline covariates) and high attrition.

Fossey et al. compared a staff training and support program designed to reduce drug use for the management of agitation/aggression ($n = 181$) with usual care ($n = 168$) over a 12-month period. Nursing homes were randomized to treatment and usual care. Residents with dementia were invited to participate in the study. The median age of residents in the treatment group was 82 years and 35 percent were female. The median age of residents in usual care was 82 years and 39 percent were female. Care staff characteristics were not provided. Staff members in the intervention group were trained in person-centered care methods and the use of nonpharmacologic behavioral management techniques. In addition, nursing homes randomized to the intervention agreed to work with a geriatric psychiatrist to review and adjust medications as needed. Treatment effects were evaluated using weighted *t* test and weighted linear regression. The authors adjusted for baseline neuroleptic use and region and found a nonsignificant decrease in the proportion of residents taking any neuroleptics in the intervention group compared with usual care at 12-month followup (-19.1; 95% CI, -41.7 to 3.0). Null effects were also observed for dose of neuroleptics and proportion of residents taking other psychotropics. Intervention and usual care did not differ significantly on agitation/aggression at 12 months (CMAI mean difference in favor of the intervention 0.3; 95% CI, -8.3 to 8.9) or on the number of aggression

episodes (mean difference in favor of intervention group of percent of residents with >1 episode of aggression (-1.6; 95% CI, -12.7 to 15.8). This study had a moderate risk of bias due to detection bias (not adjusting for multiple comparisons) and high attrition.

Evidence Synthesis and Strength of Evidence Assessment

All eligible person-centered care studies assessed agitation/aggression. Chenoweth et al. was the only study to report a statistically significant effect of PCC on agitation/aggression. However, because the effect size was unlikely to be clinically meaningful, these results should not be interpreted as evidence of effectiveness due only to the statistical difference. Rokstad et al. reported a statistically significant reduction in agitation/aggression for PCC as assessed with one instrument, but not another. To pool results, we standardized the mean between treatment group differences at the final period of followup on the primary measure of agitation/aggression from each study. Figure 6 shows the pooled analysis describing the effect of PCC on agitation/aggression in dementia. Low strength evidence shows that PCC and usual care have a similar effect on agitation/aggression in dementia (standardized mean difference -0.15; 95% CI, -0.67 to 0.38). The meta-analysis model had an I^2 of 56 percent and a Tau of 0.14.

Evidence for general behavior and intermediate outcomes was insufficient. Two of the three studies reported general patient behavioral outcomes; of these, Rokstad et al. reported a difference in general patient behavior in favor of PCC, and Chenoweth et al. reported a null effect. PCC had no effect on neuroleptic use or injuries. None of the studies reported staff outcomes.

Protocols to Reduce Use of Neuroleptics

Eligible Studies

Two studies used staff training and clinical protocols to reduce the use of neuroleptics. These studies have been grouped together.[90,91] The studies ranged in size from 258 to 346.[90,91] Resident characteristics were similar across studies, but neither study reported nursing facility or care provider characteristics.

Fossey et al. evaluated a clinical protocol to reduce neuroleptic use combined with person-centered care versus usual care. Results from this study were analyzed in both the person-centered care and in the reducing neuroleptics group. The authors adjusted for baseline neuroleptic use and region and found no difference in the proportion of residents taking any neuroleptics at 12 month followup between intervention and control (mean difference favoring the intervention group -19.1; 95% CI, -41.7 to 3.0). Null effects were also observed at 12 month followup for dose of neuroleptics (mean difference in dose of neuroleptics favoring the intervention group -4.9; 95% CI, -20.0 to 29.9) and proportion of the population taking other psychotropics. Daily dose was translated into chlorpromazine daily equivalents using the British National Formulary. Additional details of this study are reported in the PCC section.

Rapp et al. evaluated a staff-training and behavior-based intervention also designed to reduce the use of neuroleptics. The intervention (n = 163) was compared with usual care (n = 141) at 10 months. Nursing homes were randomized to treatment conditions, and residents with dementia were invited to participate in the study. The mean age of study residents was 81.56 years and 73 percent were female. The intervention consisted of two 4-hour staff training sessions on the symptomatology and causes of behavioral symptoms of dementia. Staff members were also trained on the use of physical- and activity-based nonpharmacologic therapies for the

management of behavioral symptoms. Finally, prescribers within nursing homes attended individual training sessions on the causes of behavioral symptoms and the use of a guideline-based prescribing for pharmacotherapy. The control group received treatment as usual. Repeated measures multivariate analysis of variance was used to evaluate treatment effects. At 10 months CMAI was significantly lower for residents in the treatment group than for residents in the control group (mean difference 6.24; 95% CI, 2.03 to 14.44). This represents a 3 percent improvement for residents in the treatment group compared with usual care, which may not be clinically meaningful. In addition, CMAI-aggression subscale scores significantly decreased in the intervention group (baseline mean sub score 14.03 SD = 5.82 and 10 month followup mean sub score 11.75 SD = 4.32) while increasing in the control group (baseline mean sub score 14.53 SD = 6.94 and 10 month followup mean sub score 17.12 SD = 11.07). The difference in mean change between intervention and control was significant (p = 0.012). No differences were observed between the intervention and control on the physically nonaggressive (p= 0.977) and verbally agitated (p = 0.357) subscales of the CMAI. At 10 months residents in the intervention group were prescribed fewer neuroleptics (mean difference of defined daily dosage 0.03; 95% CI, 0.01 to 0.05). The defined daily dosage was determined based on medication usage 2 weeks prior to assessment and was calculated using the German algorithm of the anatomic therapeutic chemicals. This study had a low-moderate risk of bias due to performance bias (unclear application of the intervention) and detection bias (not blinding assessors).

Evidence Synthesis and Strength of Evidence Assessment

Evidence was insufficient to draw conclusions regarding efficacy of interventions on reducing neuroleptic use, agitation/aggression, or any of the secondary outcomes. Rapp et al. reported a small but significant reduction in mean defined daily dose of neuroleptics in the intervention group. In contrast, Fossey et al. reported no difference between intervention and control in terms of total neuroleptic use or dosing. To pool results, we standardized the mean between treatment group differences of neuroleptic dose. Figure 7 shows the forest plot of the effect of the interventions on neuroleptic dose. The pooled results indicated that the interventions had no effect on neuroleptic dose (standardized mean difference -0.28; 95% CI, -3.50 to 2.94). The meta-analysis model had an I^2 of 89 percent and a Tau of 0.34.

For agitation/aggression, Fossey et al. reported a null effect for the intervention. In contrast, Rapp et al. found the intervention significantly reduced agitation/aggression. To pool results, we evaluated the mean between treatment group differences at final period of followup on CMAI. Figure 8 shows the forest plot of the effect of interventions on agitation/aggression as measured by the CMAI. In pooled results, these studies had no effect on agitation/aggression (mean difference -4.5; 95% CI, -38.84 to 29.93). The meta-analysis model had an I^2 of 32 percent and a Tau of 2.39.

Both studies reported no difference between groups in the occurrence of injuries.[90,91] Neither study reported general patient behavior or staff outcomes.

Emotion-Oriented Care

Eligible Studies

Two studies evaluated emotion-oriented care using cluster randomized designs.[92,93] Emotion-oriented care consists of understanding the resident's perception of the environment and the role of verbal and nonverbal communication in the caregiver-patient relationship. The two studies

that evaluated emotion-oriented care ranged in size from 146 to 151. Resident characteristics were similar across both studies. However, only one study provided data on the characteristics of care staff.[92]

Finnema et al. compared emotion-oriented care combined with the guideline based Model-Care plan of the Dutch Association of Nursing Home Care (n = 46) versus the guideline based Model-Care plan alone (n = 53) (i.e., usual care) over 9 months. Nursing homes were randomized to treatment conditions, and residents with dementia were invited to participate in the study. The mean age of residents in the treatment group was 83.8 years and 81 percent were female. Similarly, the mean age of residents in usual care was 83.6 years and 81 percent were female. The mean age of care staff in both treatment groups was 30 years and 87 percent were female. The emotion-oriented care component of the intervention consisted of a 2-day basic course for all staff in emotion-oriented care (e.g., staff members' experiences and application of nonverbal empathic skills). Five staff members from each intervention nursing home then participated in an advanced emotion-oriented care class. The 7-day advanced course (spread over 8 months) trained staff members on how to take life histories, acknowledge residents' experiences, and be alert to how past residents' experiences affect the present. Finally, one staff member per intervention nursing home was invited to participate in an adviser emotion-oriented training course. During this 10-day course (delivered over 9 months) the staff member was trained to organize and lead emotion-oriented care sessions for residents. These staff members were also responsible for the implementation of emotion-oriented care in their home institution. Two half-day training courses on the Model-Care plan were conducted in all intervention and usual care nursing homes. In both intervention and usual care homes, the staff training provided a methodological framework for developing individualized care plans. Multivariate analysis of variance was used to evaluate treatment effects. Residents cared for by staff randomized to the intervention group did not significantly improve agitation/aggression measures (CMAI, CMAI-PA, CMAI-VNA, BIP10- restless behavior). Compared with the usual care, staff that improved in the application of emotion-oriented care scored lower on stress reactions on the GHQ-28 ($p = 0.003$), but did not differ in stress perception scores as measured by the QOS ($p = 0.54$). This study had a low risk of bias.

Schrijnemaekers et al. compared an emotion-oriented intervention (n = 77) with usual care (n = 74). Homes for the elderly were randomized to treatment conditions and dementia residents with behavioral problems were invited to participate in the study. Homes for the elderly are similar to nursing homes, but all homes offered a structured day-care unit for residents during the day. At night, residents return to their room within the elderly home. The mean age of residents in the intervention group was 84.3 years and 90 percent were female. The mean age of residents in usual care was 85.9 years and 89 percent were female. All staff in the intervention nursing homes were trained on the goals and objectives of emotion-oriented care. In addition, eight staff caregivers in each intervention home participated in a 6-day training on emotion-oriented care. Hierarchical linear models were estimated to evaluate treatment effects. Overall there was no statistical difference between intervention and control on measures of agitation/aggression and psychotropic use. At the 6-month followup residents cared for by staff assigned to the control group had 2.3 fewer physically nonaggressive behaviors than in the treatment group (CMAI-PNA, $p < 0.001$). This represents a 1 percent improvement for usual care residents compared with residents in the intervention group, which may not be clinically meaningful. During the same time period, there were no statistical difference on the CMAI-aggression subscale, CMAI-verbal aggression subscale, or the GIP and GIP-subscales

(nonsocial behavior, loss of decorum, rebellious behavior, and restless behavior). This study had a moderate risk of bias due to high detection bias (not blinding assessors).

Evidence Synthesis and Strength of Evidence Assessment

Evidence was insufficient to draw conclusions regarding efficacy of interventions on reducing neuroleptic use, agitation/aggression, or any of the secondary outcomes.

Both studies reported no effect for emotion-oriented care on the primary measure of agitation/aggression.[92,93] Schrijnemaekers et al. reported a significant reduction in the physically nonaggressive behavior subscale of the CMAI at 6 months for the control group, but staff aware of treatment assignments made the assessments. Moreover, this effect was not sustained at 12 months. It was not possible to pool results because one study did not provide standard deviations for point estimates.[93] Finnema et al. reported significant improvement on staff stress reactions. Schrijnemaekers reported no significant differences on staff distress, burden, or quality of life. Neither study reported staff behavior outcomes, neuroleptic use, general behavioral outcomes, injuries, or adverse events.

Unique Comparisons

Eligible Studies

Eleven trials evaluated unique care-delivery level comparisons and could not be conceptually grouped. One study was conducted in an assisted living facility.[94] All other studies were conducted in nursing homes.[95-104] Studies varied in size from 31 to 306. Studies also varied in terms of unit of randomization and in reporting demographic characteristics of residents and care staff.

Deudon et al. compared an 8-week staff education and training program (n = 174) with a control group (i.e., usual care) (n = 132). Nursing homes were randomized. Staff members in each nursing home invited select dementia residents with behavioral symptoms to participate in the study. The mean age of residents in the treatment group was 86.5 years and 77 percent were female. In usual care, the mean age of residents was 86 years and 79 percent were female. Facility and care staff characteristics were not provided. A 90-minute training session was conducted in intervention nursing homes. The training session provided general information on dementia, behavioral symptoms, and the use of "how-to instruction cards." The instruction cards were for use in clinical practice and provided practical advice to care staff on how to deal with behavioral symptoms (e.g., recommendations on nonpharmacologic interventions). Trainers also visited intervention nursing homes to observe care staff. Following observations, the trainers provided feedback to staff and personalized training. Treatment effects were evaluated using Wilcoxon nonparametric test and linear mixed-effect models. At 8 and 20 weeks there was no difference between residents randomized to intervention versus control nursing homes on the CMAI and CMAI subscales.

Results from the linear mixed effects model indicated that the decline in agitation/aggression in the intervention group (CMAI coefficient -0.26 $p < 0.001$) was significantly different ($p = 0.001$) than the mean change observed in the control group (coefficient 0.02 $p = 0.797$). Similar results were observed on the physically nonaggressive and verbally nonaggressive subscales of the CMAI (difference in change between intervention and control $p < 0.001$). While these significant improvements for the intervention group, they represent small improvements and are unlikely to be clinically meaningful. Mean change did not differ significantly between residents

in the intervention group and residents in the control group on the physically aggressive and verbally aggressive behavior subscales of the CMAI. Finally, no significant changes were observed on the NPI hyperactivity subscale or psychotropic use for the intervention and control groups. This study had a low-moderate risk of bias due to possible selection bias (unclear description of randomization), and possible attrition bias (unclear description of attrition).

Proctor et al. compared a staff-training program combined with psychosocial management of behavioral symptoms (n = 60) with a control group (i.e., usual care) (n = 60). Residential homes and nursing homes were randomized. In each home, staff members selected 10 residents with behavioral problems to participate in the study. Not all residents had dementia. The mean age of residents who completed assessments at baseline and 6 month followup was 83.1 years and 83 percent were female. Facility and care staff characteristics were not provided. Staff training consisted of seven 1-hour seminars over 6 months on staff-identified topics (e.g., management of dementia and aggression). An experienced psychiatric nurse conducted the psychosocial management portion of the intervention. The psychiatric nurse visited intervention nursing homes and advised and supported staff in developing care plans for residents. The control group received treatment as usual. Generalized estimating equations were estimated to evaluate treatment effects.

After adjusting for baseline differences, there was no statistical difference in behavioral symptoms for residents in the intervention group compared with residents in the control group at 6 month followup (difference on the Crichton scale -0.7; 95% CI, -3.0 to 1.6). This study had a low-moderate risk of bias due to potential selection bias (unbalanced on key baseline variables), potential performance bias (unclear description of the intervention), and potential detection bias (unclear if assessors were blinded).

Clare et al. compared a staff-training program using the AwareCare measure (n = 32) with a control group (i.e., usual care) (n = 33). Care homes were randomized, and care home managers identified and invited residents with severe dementia. Care home managers also identified select care staff to participate in the study. The mean age of residents in the intervention group was 82.3 years and 32 percent were female. The characteristics of residents in usual care were similar. The mean age of care staff in the intervention and control group was 38 years and most were female. The intervention was conducted over 8 weeks and consisted of training staff members to consider residents' awareness and use the AwareCare observational method. In addition, study investigators provided feedback to staff on communication with residents. Analysis of covariance was used to evaluate treatment effects.

At 8 weeks from baseline, residents in the intervention group did not improve significantly compared with residents in the control group on behavioral (Positive Response Scale p = 0.62) or key staff outcomes (staff burnout and general health). This study had a low risk of bias.

Wenborn et al. compared an occupational therapy intervention that aimed to increase resident social activity (n = 104) with a control group (i.e., usual care) (n = 106). Care homes and nursing homes were randomized. Residents were invited to participate in the study if they had dementia. The mean age of residents in the intervention group was 84.2 years and 66 percent were female. In the usual care group the mean age of residents was also 84.2 years and 75 percent were female. The intervention consisted of an assessment of the care home's physical environment, a staff education program, and one-to-one staff coaching sessions. Five 2-hour sessions focused on teaching staff to how to identify resident interests and to engage residents in meaningful activities. A trained interventionist worked directly with staff and residents on providing meaningful activities. Usual care consisted of normal practice.

Analysis of covariance and multilevel modeling was used to evaluate treatment effects. Resident behavior did not significantly differ between the intervention and control groups as measured by the CBS and CAPE-BRS at 4 or 12 months. The 12-month adjusted results were similar to unadjusted results. Finally, the groups did not differ significantly in use of total medications. This study had a low-moderate risk of bias due to potential performance bias (treatment fidelity is not clear) and potential attrition bias.

Kovach et al. compared a clinical protocol designed to enhance comfort in dementia patients and manage behavioral symptoms (n = 57) with an educational control (n = 57). Long-term care facilities were randomized. Residents with dementia were identified and invited to participate in the study. The mean age of residents in the treatment group was 86.58 years and 74 percent were female. In the control group, the mean age of residents was 86.53 years and 77 percent were female. Staff members in the intervention group participated in a 7-hour training focused on the use of a protocol consisting of a physical and affective assessment followed by targeted therapy. Examples of targeted therapy include nonpharmacologic interventions, analgesics, or consultations with other practitioners. Staff members in the control group were given information on misconceptions about aging, dementia, and approaches to treating behaviors associated with dementia. Repeated measures analysis of variance was used to test for treatment effects. Staff nurses in both groups recorded patient behavior. Behavior was measured using BEHAVE-AD.

At 2 weeks and 4 weeks post treatment there was no significant time by group interaction for the measure of behavior, and both intervention and control reported reductions in behavior (BEHAVE-AD). Following treatment, more subjects in the intervention returned to baseline behaviors than in the control group ($p = 0.002$). This study had a moderate risk of bias due to potential selection bias (method of randomization not clear) and detection bias (assessors not blinded).

Magai et al. compared a staff-training program in nonverbal sensitivity (n = 41) with a behavioral placebo group (n = 23) and a wait-list control group (n = 27). Three nursing homes were randomly assigned to treatment conditions. Within each nursing home dementia residents and care staff were invited to participate in the study. The mean age of residents across all groups was 85.9 years and 93 percent were female. The mean age of care staff in all groups was 41.6 years and all were female. Nonverbal sensitivity training consisted of 10 hour lectures over 2 weeks on issues of nonverbal communication and emotional expression. The lectures also covered cultural aspects related to patient affect, including basic emotions, personal emotional triggers, and body language. The behavioral placebo group also participated in 10 hour-long lectures over 2 weeks. Lectures focused on behavioral symptoms of dementia and not on patient affect. The wait-list control received usual care until after the study period, at which point they received training in nonverbal sensitivity. Repeated measures analysis of variance was used to evaluate treatment effects.

There were no statistically significant time, treatment, or time by treatment interaction effects for patient symptomology (an aggregate measure incorporating CDS, CMAI, and BEHAVE-AD). This study had a moderate risk of bias due to potential selection bias (method of randomization not clearly explained and unbalanced on several baseline measures), and potential detection bias (potentially underpowered given no power calculation and small sample size [N = 91]).

McCallion et al. compared a nursing assistant communication skills program (n = 49) with a wait-list control group (n = 56). Two nursing homes participated in the study. Within each nursing home, one unit was randomized to the treatment group and the other to the control group. Data

was also collected from dementia residents in the units that participated in the study. The mean age of residents in the treatment group was 84.5 years and 86 percent were female. In the control group, the mean age of residents was 83.3 years and 89 percent were female. The mean age of care staff in the treatment group was 40.9 years and 95 percent were female. Care staff in the control group had similar characteristics. For staff assigned to the intervention group, a master's level social worker led five 45-minute group sessions on knowledge of dementia, verbal and nonverbal communication, memory aids, and problem behaviors. Social workers also led four 30-minute individual sessions to help care providers identify barriers to communication, recognize verbal and nonverbal messages conveyed by residents, and provide feedback on the use of memory charts (e.g., the use of signs and labeling property to help residents). All social workers had experience with dementia patients and all participated in four half-day training sessions.

Random effect regression models were estimated to evaluate treatment effects. Significant time by group interactions were observed over 3 months ($F = 7.76$; $p < 0.01$) and 6 months ($F = 18.64$, $p < 0.001$) for the treatment group compared with the control group on the behavioral disturbance subscale of the CSDD. Over 3 months, there was also a significant time by group interaction ($F = 17.59$; $p < 0.001$) on the physically nonaggressive behavior subscale of the CMAI in favor of the treatment group. Significant time by group interactions was also observed on the verbally aggressive behavior subscales of the CMAI at 3 ($F = 32.97$; $p < 0.001$) and 6 months ($F = 14.23$; $p < 0.001$) in favor of the treatment group. However, at 6 months, staff in the intervention group increased significantly in the use of restraints ($F = 9.54$; $p < 0.01$). There was no difference in use of psychotropics. This study had a moderate risk of bias due to potential selection bias (unclear method of randomization and some baseline variables not balanced), potential detection bias (potentially underpowered given no power calculation and small sample size [N = 105]), and potential selection bias (staff attrition greater than 20 percent and information on resident attrition not provided).

Teri et al. evaluated an intervention aimed at improving interactions between care staff, the environment, and residents compared with usual care. Only an overall sample size was provided ($n = 31$). The two-phase study consisted of first a feasibility study and then a randomized trial conducted in the same site to evaluate the effect of the intervention compared with usual care. A sample of assisted living facilities that previously participated in a feasibility study was randomly assigned to treatment conditions. Dementia residents with behavioral problems were invited to participate in the study. The mean age of residents across both treatment conditions was 85.8 years and 87 percent were female. The mean age of staff across both groups was 37.4 years and 96 percent were female. Assisted living staff participated in two half-day workshops and four individualized sessions delivered over 2 months. Each training session was modular and focused on basic information on dementia, verbal and nonverbal skills for communicating with residents, maintaining pleasant events for residents, improving communication between staff and families, and using a framework of activators, behaviors, and consequences for identifying and decreasing resident distress. Staff in usual care received general information on needs of older adults and techniques for caring for residents with dementia. General linear models were estimated to evaluate treatment effects.

Compared with usual care, residents in the intervention group had statistically significant improvements on behavioral outcomes. NPI scores declined 3.5 (SD 8.1) points in the intervention group and increased 2.7 (SD 10) points in the control group. The difference in change over time between intervention and control was significant ($p = 0.031$). This reflects an improvement in behavior for residents in the intervention. Total RMBP scores significantly

declined (indicating improvement) in the intervention group (mean change from baseline -1.1 SD 1) and increased in the control group (mean change from baseline 0.2 SD 0.8). The difference in change was significant ($p < 0.001$) and favored residents in the treatment group. In addition, the difference in change on the ABID between the intervention and control was significant in favor of the intervention (mean change in intervention -3.8 SD 4.0, mean change in control -0.5 SD 6.7, significance of difference in change $p < 0.001$). Staff also benefited from the intervention compared with the control, and significant differences were observed on NPI staff impact (mean change in intervention -1.2 SD 5.3, mean change in control 1.6 SD 4.2, significance of difference in change $p = 0.022$) and total RMBPC-reaction measures (mean change in intervention -0.7 SD 1.0, mean change in control 0.2 SD 0.8, significance of difference in change $p < 0.001$). Although significant improvements in favor of intervention were observed, these improvements were small and may not be clinically meaningful. No significant difference was observed for staff job satisfaction. This study had a moderate risk of bias due to potential selection bias (information on randomization not provided), using the same site for feasibility testing and implementation, potential detection bias (no power calculation and small sample size [residents N = 31, staff N = 25]), and potential attrition bias (information on attrition not provided).

Chapman, et al. compared the effectiveness of Advance Illness Care Teams (AICT) (n = 57) with usual care (n = 61). Participants were recruited from two large northeastern United States nursing homes. To be invited to participate in the study residents had to have dementia, needed assistance with four or more ADLs, scored 23 or less on the MMSE, and scored 4 or more on the GDS. The mean age of residents in AICT was 84.82 years and 95 percent were female. The mean age of residents in usual care was 88 years and 98 percent were female. AICT consisted of staff teams applying a holistic approach (medical issues, meaningful activities, psychological problems, and behavioral concerns) to the care of dementia residents. Staff teams were multidisciplinary (medicine, nursing, social work, OT/PT, psychology, and nutrition). AICT teams met eight times (once a week) to develop and apply interventions across the holistic domains of the intervention.[103] Families were invited to the team meeting at week 3 and week 8. Residents randomized to usual care received normal care (e.g., medication management, nursing care, and social-recreational activities). Random effects regression models were used to evaluate treatment effects. Agitation/aggression was measured using the CMAI at baseline and 8 weeks. Physically nonaggressive behavior significantly declined in the treatment group compared with usual care ($p < 0.05$). No other significant group and time interactions were observed.

McGilton et al. compared a wayfinding intervention (n = 17) with a control group (n = 15).[104] Residents with dementia in the cognitive support units of a nursing home section of a large, university-affiliated geriatric center were invited to participate in the study. Residents were being relocated to a new facility, which meant that all residents needed to learn their new environments, enabling the investigators to look at the effects of the wayfinding. The study started 6 weeks post-relocation to a new building. The mean age of residents in the treatment group was 86.2 years and 94 percent were female. The mean age of residents in the control group was 89.2 years and 67 percent were female. Wayfinding includes backwards chaining intervention, which focuses on residents' ability to find their way to a specific location. Intervention lasted for 30 minutes, three times a week, for 4 weeks. Outcomes included the Pittsburgh Agitation Scale. Repeated measures analysis of variance was used to evaluate treatment effects. At 3 months after the intervention there was no significant group and time interaction on the measures of agitation/aggression.

Evidence Synthesis and Strength of Evidence Assessment

Eleven trials studied interventions that could not be conceptually grouped with other studies.[94-104] These trials typically had small sample sizes and methodological problem, so evidence was insufficient for all comparisons and outcomes. To evaluate any trends across the studies we plotted standardized effects of each intervention on agitation/aggression in a forest plot (Figure 9). All of the interventions reported null effects on agitation/aggression, and the forest plots provide evidence of consistency across studies. Studies have wide confidence intervals indicating an overall lack of precision.

Reports of other outcomes of interests in these studies was sparse. Five studies reported general behavioral outcomes. Four of these studies reported a null effect,[95,100-102] and one study reported an effect in favor of treatment.[94] Two studies reported no effect on neuroleptic use.[95,98] None of the other studies reported medication use. Two studies reported multiple outcomes related to staff behavior and distress.[94,101] Results were mixed, with both no effect and effects in favor and against the intervention. No other outcomes were reported.

Table 7. Care-delivery level interventions for agitation/aggression in nursing home and assisted living facility residents with dementia

Intervention-Comparison	Total Number of Studies (Number of participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Dementia Care Mapping	3 (643)	Low – agitation/aggression not improved
Person Centered Care	3 (813)	Low – agitation/aggression not improved
Protocols to reduce Neuroleptic Use	2 (604)	Insufficient – no conclusions drawn
Emotion Oriented Care	2 (297)	Insufficient – no conclusions drawn
General Behavior		
Dementia Care Mapping	3 (643)	Insufficient – no conclusions drawn
Person Centered Care	2 (467)	Insufficient – no conclusions drawn
Protocols to reduce Neuroleptic Use	No Studies Reported	Insufficient – no conclusions drawn
Emotion Oriented Care	No Studies Reported	Insufficient – no conclusions drawn
Intermediate Outcomes		
Dementia Care Mapping	1 (180)	Insufficient – no conclusions drawn (staff behavior)
	1 (158)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Person Centered Care	2 (505)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Protocols to reduce Neuroleptic Use	2 (604)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Emotion Oriented Care	1 (151)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Secondary Outcomes		
Dementia Care Mapping	1 (159)	Insufficient – no conclusions drawn (injuries)
	1 (180)	Insufficient – no conclusions drawn (staff distress/burden/quality of life)
Person Centered Care	1 (159)	Insufficient – no conclusions drawn (injuries)
Protocols to reduce Neuroleptic Use	No Studies Reported	Insufficient – no conclusions drawn
Emotion Oriented Care	1 (146)	Insufficient – no conclusions drawn (staff distress/burden/quality of life)

Table 8. Efficacy and comparative effectiveness of care-delivery interventions for agitation/aggression in nursing home and assisted living facility residents with dementia

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Dementia Care Mapping				
Chenoweth 2009[87] RCT Australia Dementia Care Mapping vs. Usual Care k=3; n=159 Low	- Staff Training and implementation of dementia-care mapping - Study investigators and two care staff trained by Bradford-trained experts led dementia-care mapping - Care mapping sessions focused on observing positive and negative care delivery. Following observations feedback was provided to nurses and care plans were developed [nursing home, 6 hours a day for 2 days]	***Staff Behavior:*** NR ***Neuroleptic Use*** **Baseline** Adjusted Proportion=0.15% vs. 0.19% **postintervention (4 months)** Adjusted Proportion=0.19% vs. 0.14% **postintervention (8 months)** Adjusted Proportion=0.15% vs. 0.14% Hierarchical linear model: p-value for group: 0.01 Hierarchical linear model: p-value for group x time: 0.66	***Agitation/Aggression*** **CMAI** AMD (CI)=-10.9 (-21.1 to -0.7) ***General Behavior*** **NPI, baseline** Adjusted Mean (SE)=12.7 (5.1) vs. 16.9 (5.3) **NPI, postintervention (4 months)** Adjusted Mean (SE)=16.8 (5.1) vs. 20.2 (5.4) **NPI, followup (8 months)** Adjusted Mean (SE)=12.7 (5.1) vs. 16.9 (5.3) Hierarchical linear model: p-value for group: 0.68 Hierarchical linear model: p-value for group and group x time: 0.30 ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR ***Incidents*** **Falls, injuries, drug errors, behavioral events, baseline** Adjusted Proportion=0.40% vs. 0.25% **Falls, injuries, drug errors, behavioral events, postintervention (4 months)** Adjusted Proportion=0.49% vs. 0.37% **Falls, injuries, drug errors, behavioral events, followup (8 months)** Adjusted Proportion=0.46% vs. 0.37% Hierarchical linear model: p-value for	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			group and group: 0.15 Hierarchical linear model: p-value for group x time: 0.89	
Rokstad 2013[88] RCT Norway Dementia Care Mapping vs. Usual Care K=3; n=308 Moderate	- Two care staff members were trained in dementia-care mapping. Rest of staff received 3-hour lecture on dementia-care mapping. - Dementia care mapping was used as a process tool to develop care staff skills in person centered care (nursing home, dementia-care mapping at beginning of study and 6-months)	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** ***Brief Agitation Rating Scale*** MC (p-value between group)=-1.5 vs. 0.2 (0.06) Multivariate regression: Coefficient (CI)= -2.0 (-5.1 to 1.1) ***Agitation-NPI-Q Agitation*** MC(p-value between group)=-0.3 vs. 0.5 (<0.01) Multivariate regression: Coefficient (CI)= -0.9 (-1.7 to -0.04) ***General Behavior – NPI-Q*** MC(p-value between group)=-0.2 vs. 1.4 (<0.01) Multivariate regression: Coefficient (CI)= -2.7 (-4.6 to -0.7) ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR
Van de Ven 2013[89] RCT Netherlands Dementia Care Mapping vs. Usual Care K=3; n=180 Moderate	- Two-staff from each nursing home were trained (using dementia-care mapping Netherlands guidelines) and certified in dementia-care mapping. Nursing homes were also given a briefing on dementia-care mapping (nursing home, 2 dementia-care mapping cycles [observation, feedback, action plan]).	***Staff Behavior*** ***QEAW emotion reactions, baseline*** Mean (SE)=13.69 (1.51) vs. 9.48(1.40) ***QEAW emotion reactions,*** **postintervention (4 months)** Mean (SE)=23.38 (1.67) vs. 25.97 (1.59) ***QEAW emotion reactions,*** **postintervention (8 months)** Mean (SE)=53.28 (1.20) vs. 53.09 (1.12)	***Agitation/Aggression*** ***CMAI*** MD (CI)= 2.4 (-2.7 to 7.6) ***General Behavior*** **NPI-NH, baseline** Mean (SE)=5.35 (0.94) vs. 6.28 (0.88) **NPI-NH postintervention (4 months)** Mean (SE)=7.19 (0.95) vs. 4.45 (0.88) **NPI-NH followup (8 months)** Mean (SE)=6.28 (0.92) vs. 4.13 (0.86) *Linear mixed-effect model* *p-value for group: 0.23* *Linear mixed-effect model*	***Staff Distress*** **GHQ 12, baseline** Mean(SE)=17.48 (0.33) vs. 16.67(0.29) **GHQ 12 postintervention (4 months)** Mean(SE)=15.72 (0.38) vs. 14.89(0.34) **GHQ 12 postintervention (8 months)** Mean(SE)=14.57

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
		Linear mixed-effect model *p*-value for group: 0.719 *Linear mixed-effect model* *p*-value for group * time: 0.015 ***Neuroleptic Use:*** NR	*p-value for group * time: 0.02*	(0.37) vs. 14.42(0.32) Linear mixed-effect model p-value for group: 0.122 Linear mixed-effect model p-value for group * time: 0.43 ***Staff Burden*** NR ***Staff QoL*** **MJSS-HC, baseline** Mean(SE)=76.98 (1.36) vs. 77.29(1.44) **MJSS-HC, postintervention (4 months)** Mean(SE) =76.40 (1.34) vs. 75.10(1.43) **MJSS-HC, postintervention (8 months)** Mean(SE)=78.08 (1.40) vs. 75.58(1.46) Linear mixed-effect model p-value for group: 0.56 Linear mixed-effect model p-value for group * time: 0.069
Person-Centered Care				
Chenoweth 2009[87] RCT Australia Dementia Care Mapping vs. Usual Care	- Training in person centered care using the Bradford University training manual. - Training focused on	***Staff Behavior:*** NR ***Neuroleptic Use*** **Baseline** Adjusted Proportion=0.42% vs. 0.19%	***Agitation/Aggression*** **CMAI** AMD (CI)=-13.6 (-23.9 to -3.3) ***General Behavior*** **NPI, baseline**	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
k=3; n=141 Low	teaching caregivers to interpret behavior as a form of communication [nursing home, 2-day training session + 2-visits by study investigators to implement person-centered care + conference calls between investigators and staff]	**postintervention (4 months)** Adjusted Proportion=0.30% vs. 0.14% **postintervention (8 months)** Adjusted Proportion=0.34% vs. 0.14% Hierarchical linear model: p-value for group: 0.01 Hierarchical linear model: p-value for group x time: 0.66	Adjusted Mean (SE)=21.3 (6.8) vs. 16.9 (5.3) **NPI, postintervention (4 months)** Adjusted Mean (SE)=16.8 (5.1) vs. 20.2 (5.4) ***General Behavior*** **NPI, followup (8 months)** Adjusted Mean (SE)=13.5 (5.1) vs. 15.3 (5.3) Hierarchical linear model: p-value for group: 0.68 Hierarchical linear model: p-value for group x time: p = 0.30 ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR ***Incidents*** **Falls, injuries, drug errors, behavioral events, baseline** Adjusted Proportion=0.43% vs. 0.25% **Falls, injuries, drug errors, behavioral events, postintervention (4 months)** Adjusted Proportion=0.53% vs. 0.37% **Falls, injuries, drug errors, behavioral events, followup (8 months)** Adjusted Proportion=0.44% vs. 0.37% Hierarchical linear model: p-value for group and group: 0.15 Hierarchical linear model: p-value for group x time: 0.89	
Rokstad 2013[88] RCT Norway Dementia Care Mapping	- A 24-indicator framework to evaluate person-centered care. Three nurses from each ward	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** ***Brief Agitation Rating Scale*** MC (p-value between group) =-1.2 vs. 0.2 (0.17)	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
vs. Usual Care K=3; n=288 Moderate	attended a 3-day training seminar on person-centered care. These nurses then led the person-centered care intervention (nursing home, 45-60 minutes weekly staff meetings to analyze patient-nurse interactions, meetings chaired by nurse trained in VPM method) - A 3-hour class to all staff regarding the VPM methodology was also provided.		Multivariate regression: Coefficient (CI) = -1.1 (-3.8 to 1.6) ***NPI-Q Agitation*** MC (p-value between group) =-0.5 vs. 0.5 (<0.01) Multivariate regression: Coefficient (CI) = -0.9 (-1.6 to -0.01) ***General Behavior*** ***NPI-Q*** MC(p-value between group) =-0.7 vs. 1.4 (<0.01) Multivariate regression: Coefficient (CI) = -2.4 (-4.1 to -0.6) ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	
Fossey 2006*[90] RCT England Clinical Protocol Combined with Person Centered Care vs. Usual Care K=3; n=346 Moderate *This study fits in person-centered care and reducing neuroleptics	- Staff training in delivery of person centered care and understanding the role of the environment in the patient caregiver relationship. - Training in Cohen-Mansfield behavioral management technique [nursing home, training program in person-centered care, training delivered by psychologist, occupational therapist, or nurse to staff caregivers, study investigators provided weekly supervision over 10-months]	***Staff Behavior:*** NR ***Neuroleptic Use*** ***% taking neuroleptics*** MD (CI) = -19.5% (-47.1% to 3.0%) ***Dose of neuroleptics*** AMD (CI) = -4.0% (-29.9% to 22.0%) ***% taking other psychotropic*** MD (CI) = 5.9% (-27.2% to 15.5%)	***Agitation/Aggression*** **CMAI** AMD (CI) = -0.3 (-8.3 to 8.9) ***Agitation*-% of population with >1 episode of aggression** MD (CI) = -1.6% (-12.7% to 15.8%) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
	- Prescribers worked with study psychiatrists 2-days a week for 10-months to review medication use.			
Reducing Neuroleptics				
Fossey 2006*[90] RCT England Clinical Protocol Combined with Person Centered Care vs. Usual Care K=2; n=346 Moderate *This study was fits into two groups person-centered care and reducing neuroleptics	- Staff training in delivery of person centered care and understanding the role of the environment in the patient caregiver relationship. - Training in Cohen-Mansfield behavioral management technique (nursing home, training program in person-centered care, training delivered by psychologist, occupational therapist, or nurse to staff caregivers, study investigators provided weekly supervision over 10-months) - Prescribers worked with study psychiatrists 2 days a week for 10-months to review medication use.	***Staff Behavior:*** NR ***Neuroleptic Use -% taking neuroleptics*** MD (CI) = -19.5% (-3.0% to 41.7%) ***Neuroleptic Use -Dose of neuroleptics*** AMD (CI) = -4.0% (-29.9% to 22.0%) ***% taking other psychotropic*** MD (CI) = 5.9% (-27.2% to 15.5%)	***Agitation/Aggression*** **CMAI** AMD (CI) = -0.3 (-8.3 to 8.9) **% of population with >1 episode of aggression** MD (CI) = -1.6% (-12.7% to 15.8%) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR
Rapp 2013[91] RCT Germany Clinical Protocol vs. Usual Care K=2; n=258 Low-Moderate	- Nursing home staff received training over two 4-hour sessions on general information about dementia. - Use of activity-based interventions 1-2 days a week for 45 minutes.	***Staff Behavior:*** NR ***Neuroleptic Use*** **Dose of neuroleptic** AMD (CI) = -0.03 (-0.05 to -0.03)	***Agitation/Aggression*** **CMAI** AMD (CI) = -6.24 (-14.14 to -2.03) **CMAI aggressive behavior subscale** F-value (p-value) group x time: 6.442 (0.012) **CMAI physically nonaggressive behavior**	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study Design Country Comparison k= ; n= Study Risk of Bias	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument* Results**	***Primary Outcome-Instrument* Results**	***Secondary Outcome-Instrument* Results**
	- To optimize drug therapy prescribers were trained in individual sessions for 4-hours		F-value (p-value) group x time: 0.001 (0.977) **CMAI verbally agitated behavior** F-value (p-value) group x time: 0.853 (0.357) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** **NR**	
Emotion Oriented Care				
Finnema 2005[92] RCT Netherlands Emotion oriented care vs. Control k=2; n=146 Low	- A two day-course for all nursing home care staff on emotion-oriented care (staff experience and understanding resident experiences). - Seven-day advanced course over 8-months for select staff focused on making life histories and acknowledging patient experiences. - Ten day adviser course over 9-months for select staff focused on implementation on emotion oriented care. These staff also led emotion-oriented group sessions for residents.	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **CMAI** Multivariate Analysis of Variance Adjusted Means (F-test, p-value): 3.34 vs. 3.63 (0.43, 0.51) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Staff Distress*** **Stress reactions** **GHQ 12** Multivariate Analysis of Variance Adjusted Means improved and not improved (F-test, p-value): treatment 15.42 and 20.47 and control 19.14 and 14.19 (9.11, 0.003). **Staff distress-Stress perception QOS** Multivariate Analysis of Variance Adjusted Means improved and not improved (F-test, p-value): treatment 23.02 and 24.73 and control 22.59 and 23.70 (1.51, 0.54) ***Staff Burden:*** NR ***Staff QoL:*** NR
Schrijnemaekers 2002[93] RCT Netherlands	- All nursing home staff received 1-hour clinical lesson on goal of	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR ***Psychotropic Use***	***Agitation/Aggression*** **CMAI-verbal aggression** Day-care unit caregivers linear	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Emotion Oriented Care vs. Usual Care k= 2; n =151 Moderate	emotion-oriented care. - Eight-staff caregivers received training in emotion-oriented care. Three half-day supervision meetings to help implement emotion-oriented care.	Ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.00 (NS) 3-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.00 (NS) 6-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.07 (NS) 12-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.02 (NS)	multilevel model adjusted MD per month (p-value): 0.04 (NS) 3-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 1.54 (NS) 6-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.78 (NS) 12-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.41 (NS) Ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.14 (NS) 3-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.07 (NS) 6-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -1.10 (NS) 12-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -1.41 (NS) **CMAI aggression** Day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.04 (NS) 3-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.59 (NS) 6-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.12 (NS) 12-month day-care unit caregivers	

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			linear multilevel model adjusted MD per month (p-value): 0.67 (NS) Ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.13 (NS) 3-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.87 (NS) 6-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.83 (NS) 12-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -1.18 (NS) **CMAI physical nonaggression** Day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.03 (NS) 3-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.70 (NS) 6-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): -0.85 (NS) 12-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.97 (NS) Ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.14 (NS) 3-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.28 (NS) 6-month ward unit caregivers linear	

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			multilevel model adjusted MD per month (p-value): -2.26 (<0.01) in favor of control 12-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -1.27 (NS) **GIP nonsocial** Day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.04 (NS) 3-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.35 (NS) 6-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.84 (NS) 12-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.08 (NS Ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.05 (NS) 3-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 1.96 (NS) 6-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 1.78 (NS) in favor of control 12-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 1.01 (NS) **GIP loss of decorum** Day-care unit caregivers linear multilevel model adjusted MD per	

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			month (p-value): 0.01 (NS) 3-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.47 (NS) 6-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.38 (NS) 12-month day-care unit caregivers linear multilevel model adjusted MD per month (p-value): 0.18 (NS Ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.00 (NS) 3-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.05 (NS) 6-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): 0.05 (NS) in favor of control 12-month ward unit caregivers linear multilevel model adjusted MD per month (p-value): -0.10 (NS) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	
Unique Comparisons				
Deudon 2009[95] RCT France Staff education vs. Control k=1; n=306 Low-Moderate	- 90-minute teaching session on dementia to nursing home care staff. Use of how-to instruction cards providing practical advice on how to deal with behaviors.	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR **Baseline** Mean (SD) =2.52 (1.3) vs. 2.68 (1.65) **Postintervention (8 weeks)** Mean (SD) =2.62(1.3) vs. 2.76	***Agitation/Aggression*** **CMAI** Linear mixed effect model coefficient for MC (SD) [p-value for difference between intervention and control]: -0.26 (0.05) vs. 0.02 (0.06) [0.001] **CMAI physically nonaggressive**	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
	- Trainers available to staff for 2-hours twice a week	(1.6) **Postintervention (20 weeks)** Mean (SD) =2.51 (1.3) vs. 2.81 (1.6)	**behavior** Linear mixed effect model coefficient for MC(SD) [p-value for difference between intervention and control]: -0.02(0.002) vs. -0.003(0.03) [<0.0001] **CMAI verbally nonaggressive behavior** Linear mixed effect model coefficient for MC (SD) [p-value for difference between intervention and control]: -0.02 (0.003) vs. 0.001 (0.004) [<0.001] **CMAI physically aggressive behavior** Linear mixed effect model coefficient for MC (SD) [p-value for difference between intervention and control]: -0.001 (0.002) vs. 0.004 (0.002) [0.142] **CMAI verbally aggressive behavior** Linear mixed effect model coefficient for MC for MC (SD) [p-value for difference between intervention and control]: -0.01 (0.004) vs. -0.001 (0.004) [0.571] ***General Behavior*** **NPI-Hyperactivity factor** Linear mixed effect model coefficient for MC (SD) [p-value for difference between intervention and control]: -0.25 (0.2) vs. 0.35 (0.2) [0.032] ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*:** NR	
Proctor 1999[99] RCT England Staff Education and Care Planning vs. Usual Care	- Nursing home staff received seven 1-hour educational seminars on dementia.	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation:*** NR ***General Behavior*** ***CRB*** AMD (CI) = -0.7 (-3.0 to 1.6)	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
k=1; n=120 Low-Moderate	- Weekly psychiatric nurse visits to support developing care plans.		***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*:** NR	
Clare 2013[101] RCT England Staff Training in Aware Care vs. Usual Care k=1; n=65 Low	- Nursing home staff received 8-week training. In the first two weeks staff received two 90-minute training sessions on resident awareness and use of AwareCare measures and 6-periods of staff observation and weekly support.	***Staff Behavior*** ***MBI Depersonalization*** Analysis of Covariance Adjusted Means (SE): 1.32(0.04) vs. 0.53 (0.07) Analysis of Covariance F-test (p-value) of group * time: 2.55 (0.12) ***Neuroleptic Use:*** NR	***General Behavior*** ***PRS*** Analysis of Covariance Adjusted Means (SE): 37.39(2.32) vs. 34.71 (2.17) Analysis of Covariance F-test (p-value) of group * time: 0.25 (0.62) ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*:** NR	***Staff Distress*** **GHQ** Analysis of Covariance Adjusted Means (SE): 6.63 (0.82) vs. 7.12 (1.05) Analysis of Covariance F-test (p-value) of group * time: 0.22 (0.64) ***Staff Burden*** **Emotional Exhaustion** Analysis of Covariance Adjusted Means (SE):12.36 (0.07) vs. 12.38 (0.07) Analysis of Covariance F-test (p-value) of group * time: 0.00 (0.99) ***Staff QoL:*** NR
Wenborn 2013[100] RCT United Kingdom Activity Intervention vs. Usual Care k=1; n=159 Low-Moderate	- Occupational therapy assessment of physical environment. - Five 2-hour education sessions over 16-weeks to nursing home staff to improve knowledge and skill. - One-to-one coaching between study investigators and nursing	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR **Total Medications** 4-week MD (CI) = 0.10 (-0.53 to 0.34, 0.66) 12-week AMD (CI) = -0.15 (-0.55 to 0.24)	***Agitation/Aggression*** **CBS** 4-week MD (CI) = 1.15 (-9.23 to 11.52) 12-week AMD (CI) = 4.13 (-21.10 to 29.36) ***General Behavior*** **CAPE BRS** 4-week MD (CI) = 1.08 (-0.18 to 2.34) 12-week AMD (CI) = 0.52 (-1.63 to 2.67)	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
	staff to improve skill.		***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*:** NR	
Chapman 2007[103] RCT United States Advanced illness care team vs. usual care n = 118 Moderate	- Advanced illness care team (AICT) intervention: each care team met five times during the intervention period, care teams consisted of staff working in each of the units at the nursing homes (medicine, nursing, social work, psychology, PT, OT, nutrition), residents and families were invited to participate in a planning meeting of each AICT that occurred during weeks 3 and 8, AICTs address 4 domains of care (medical issues, meaningful activities, psychological problems, and behavioral concerns) - Usual care (wait list control) participants received typical services and received treatment after the 8 week usual care period	***Neuroleptic Use:*** NR	***Agitation/Aggression*** **CMAI – Aggressive behavior,** mean (SD) Baseline: 1.18 (0.47) vs. 1.23 (0.48) 8 weeks: 1.10 (0.25) vs. 1.16 (0.39) **CMAI – Physically nonaggressive behavior,** mean (SD) Baseline: 1.64 (1.10) vs. 1.36 (0.52) 8 weeks: 1.30 (0.60) vs. 1.29 (0.49) **CMAI – Verbally agitated behavior,** mean (SD) Baseline: 1.44 (0.48) vs. 1.44 (0.61) 8 weeks: 1.28 (0.42) vs. 1.36 (0.53)	
Kovach 2006[102] RCT United States Training in Serial Trial Intervention vs. Usual Care k=1; n=114	- Two-advanced practice nurses led long-term care nurses in a 7-hour educational seminar on how to use STI method (a five step process used to identify needs and	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** **BEHAVE AD, baseline** Mean (SD) =7.43 (6.75) vs. 6.80 (5.47) **BEHAVE AD, Postintervention (2 weeks)** Mean (SD) =5.56 (5.64) vs. 6.15 (5.55) **BEHAVE AD, Postintervention (4**	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Moderate	apply therapy to meet the need).		**weeks)** Mean (SD) =4.68 (4.06) vs. 4.96 (4.39) Repeated Measures Analysis of Variance F-test (p-value) group x time: 0.70 (0.5) ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*****:** NR	
McGilton 2003[104] RCT Canada Way-finding vs control n = 32 Moderate	- Way-finding intervention included 30 minutes 3x/week for 4 weeks of backward chaining with a research assistant - No information on control condition	***Neuroleptic Use:*** NR	***Agitation/Aggression*** **Pittsburgh Agitation Scale,** mean (SD) Baseline: 2.4 (1.6) vs. 1.8 (1.3) 1 week post-intervention: .87 (0.88) vs. 0.92 (1.0) 3 months post-intervention: 1.8 (1.1) vs. 0.92 (0.99)	
Magai 2002[97] RCT United States Staff Training vs. Behavioral Placebo and Wait-list Control k=1; n=95 Moderate	- Nursing home staff received ten 1-hour sessions over 2-weeks in nonverbal sensitivity training.	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **Aggregate measure incorporating CDS, CMAI, and BEHAVE-AD** **Baseline** Mean (SD) =83.7 (51.2) vs. 25.2 (5.2) vs. 40.6 (7.8) **Postintervention (3 weeks)** Mean (SD) =69.1 (36.1) vs. 49.6 (27.2) vs. 75.4 (41.4) **Postintervention (6 weeks)** Mean (SD) =69.1 (36.1) vs. 49.6 (27.2) vs. 75.4 (41.4) **Postintervention (9 weeks)** Mean (SD) =71.8 (37.6) vs. 44.6 (23.7) vs. 63.1 (42.0) **Postintervention (12 weeks)** Mean (SD) =65.5(37.7) vs. 39.2 (15.2) vs. 61.6(31.1) Repeated Measures Analysis of Variance F-test (p-value) for group: 2.28 (NS)	***Staff Distress:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			Repeated Measures Analysis of Variance F-test (p-value) for group x interaction: 1.15 (NS) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*****:** NR	
McCallion 1999[98] RCT United States Staff Education vs. Usual Care k=1; n=105 Moderate	- Nursing home staff received education in knowledge of dementia, verbal and nonverbal communication, memory aids, and problem behaviors over five 45-minute group sessions and four 30-minute individual conferences.	***Staff Behavior*** **Restraints Use, baseline** Mean (SD) =1.20 (1.34) vs. 1.82 (1.62) **Restraints Use, Postintervention (3 months)** Mean (SD) = 1.53 (1.56) vs. 2.04 (1.78) **Restraints Use, Postintervention (6 months)** Mean (SD)= 1.88 (1.82) vs. 1.75 (1.42) *Random effects regression* *F-test (p-value) 3-month group:* 43.99 (NS) F-test (p-value) 3-month group x interaction: 0.00 (NS) F-test (p-value) 6-month group: 7.20 (NS) F-test (p-value) 6-month group x interaction: 9.54 (<0.01) ***Neuroleptic Use:*** NR **Psychotropic Use, mean (SD)** Baseline, 0.98 (1.41) vs. 1.62 (1.70) **Postintervention (3 months)** 0.93 (1.39) vs. 1.7 (1.82) **Postintervention (6 months)**	***Agitation/Aggression*** **CSDD behavioral disturbance, baseline** Mean (SD) =2.00 (1.58) vs. 1.13 (1.06) **CSDD behavioral disturbance, Postintervention (3 months)** Mean (SD)=1.32 (1.40) vs. 0.98 (1.13) **CSDD behavioral disturbance, Postintervention (6 months)** Mean (SD)=1.26 (1.17) vs. 1.29 (1.29) Random effects regression F-test (p-value) 3-month group: 49.20 (NS) Random effects regression F-test (p-value) 3-month group x interaction: 7.76 (<0.01) F-test (p-value) 6-month group: 23.46 (NS) F-test (p-value) 6-month group x interaction: 18.64 (<0.001) **CMAI aggressive behavior, Baseline** Mean (SD)=15.16 (9.81) vs. 13.25 (7.52) **CMAI aggressive behavior, Postintervention (3 months)** Mean (SD)=11.00 (5.35) vs. 12.46 (6.82) **CMAI aggressive behavior,**	***Staff Distress:*** NR ***Staff Burden:*** NR ***Staff QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
		1.30 (2.15) vs. 1.57 (1.71) Random effects regression F-test (p-value) 3-month group: 37.48 (NS) F-test (p-value) 3-month group x interaction: 1.78 (NS) F-test (p-value) 6-month group: 4.99 (NS) F-test (p-value) 6-month group x interaction: 1.61 (NS)	**Postintervention (6 months)** Mean (SD)=12.21 (8.31) vs. 12.02 (6.22) Random effects regression F-test (p-value) 3-month group: 0.23 (NS) Random effects regression F-test (p-value) 3-month group x interaction: 8.67 (NS) F-test (p-value) 6-month group: 6.02 (NS) F-test (p-value) 6-month group x interaction: 0.92 (NS) **CMAI physically nonaggressive behavior, baseline** Mean (SD)=12.49 (6.34) vs. 11.09 (5.47) **CMAI physically nonaggressive behavior, Postintervention (3 months)** Mean (SD)=10.36 (4.72) vs. 11.86 (6.54) **CMAI physically nonaggressive behavior, Postintervention (6 months)** Mean (SD)=11.38 (5.99) vs. 10.38 (6.32) Random effects regression F-test (p-value) 3-month group: 0.56 (NS) F-test (p-value) 3-month group x interaction: 17.59 (<0.001) F-test (p-value) 6-month group: 7.78 (NS) F-test (p-value) 6-month group x	

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			interaction: 0.26 (NS) **CMAI verbally aggressive behavior, baseline** Mean (SD)=16.22 (10.31) vs. 10.44 (6.21) **CMAI verbally aggressive behavior, Postintervention (3 months)** Mean (SD)=11.3 8(7.13) vs. 11.52 (6.71) **CMAI verbally aggressive behavior, Postintervention (6 months)** Mean (SD)=12.88 (8.39) vs. 12.05 (6.86) Random effects regression F-test (p-value) 3-month group: 38.65 (NS) F-test (p-value) 3-month group x interaction: 32.97 (<0.001) F-test (p-value) 6-month group: 38.82 (NS) F-test (p-value) 6-month group x interaction: 14.23 (<0.001) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries*:** NR	
Teri 2000[105] RCT United States Staff Training vs. Usual Care k=1; n=31 Moderate	- Assisted living staff received 2-half day workshops focus on dignity and respect of patient and caregiver skill development and 4 individualized sessions.	***Staff Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **ABID** AMC (SD)=-3.8 (4.0) vs. -0.5 (6.7) ***General Behavior*** **NPI** AMC (SD)= -3.5 (8.1) vs. 2.7 (10.0) **RMBPC Total Score Frequency** AMC (SD)= -1.1 (1.0) vs. 0.2 (0.8)	***Staff Distress:*** NR ***Staff Burden*** **NPI (staff impact)** AMC (SD)= -1.2 (5.3) vs. 1.6 (4.2) **RMBPC (reaction)** AMC (SD)= -0.7 (1.0) vs. 0.2 (0.8) **RMBPC-disruption**

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, Qualifications Interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
			RMBPC Disruption Frequency AMC (SD)= -0.2 (0.2) vs. 0.0 (0.3) ***General Behavior:*** NR ***Patient Distress:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	**(reaction)** AMC (SD)= -0.1 (0.3) vs. 0.0 (0.0) ***Staff QoL*-Job Satisfaction** AMC (SD)= 0.2 (0.4) vs. 0.00 (0.05)

ABID=Agitated Behavior in Dementia; BEHAVE-AD=Behavioral Pathology in Alzheimer's disease; BMD=Behavior and Mood Disturbance; BRSD=Behavior Rating Scale for Dementia; MBPC=Memory and Behavior Problem Checklist; MOSES=Multi-dimensional Observation Scale for Elderly Patients; NPI=Neuropsychiatric Inventory; REHAB=Rehabilitation Evaluation Hall and Baker; RMBPC=Revised Memory and Behavior Problem Checklist

Figure 5: Random effects meta-analysis for the effect of dementia care mapping on agitation/sggression

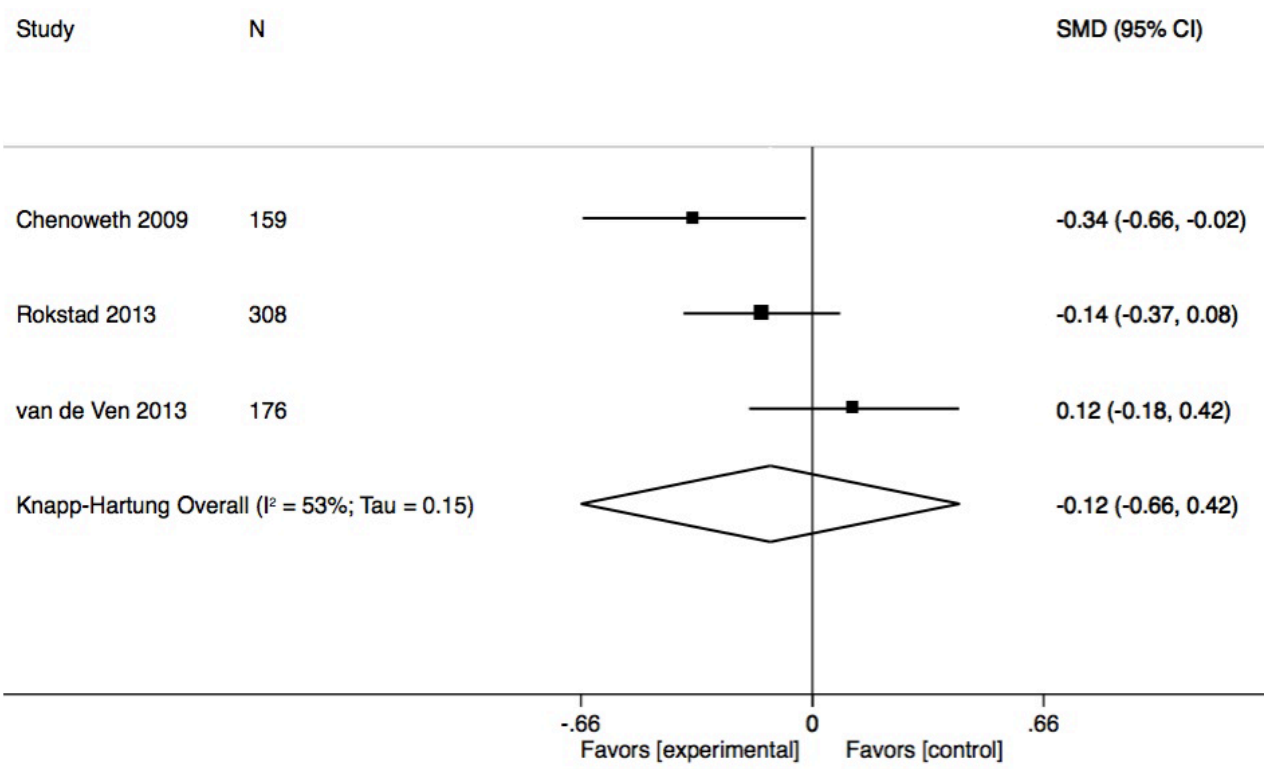


Figure 6: Random effects meta-analysis for the effect of person centered care on agitation/aggression

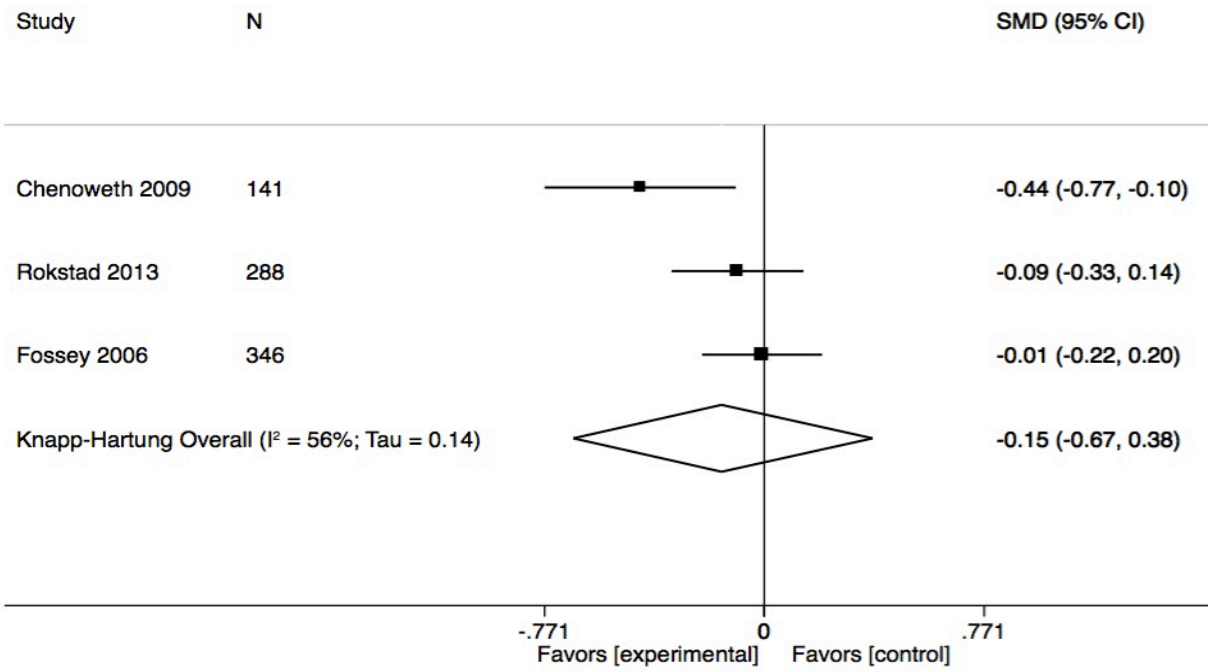


Figure 7: Random effects meta-analysis for the effect of clinical protocols on dose of neuroleptics

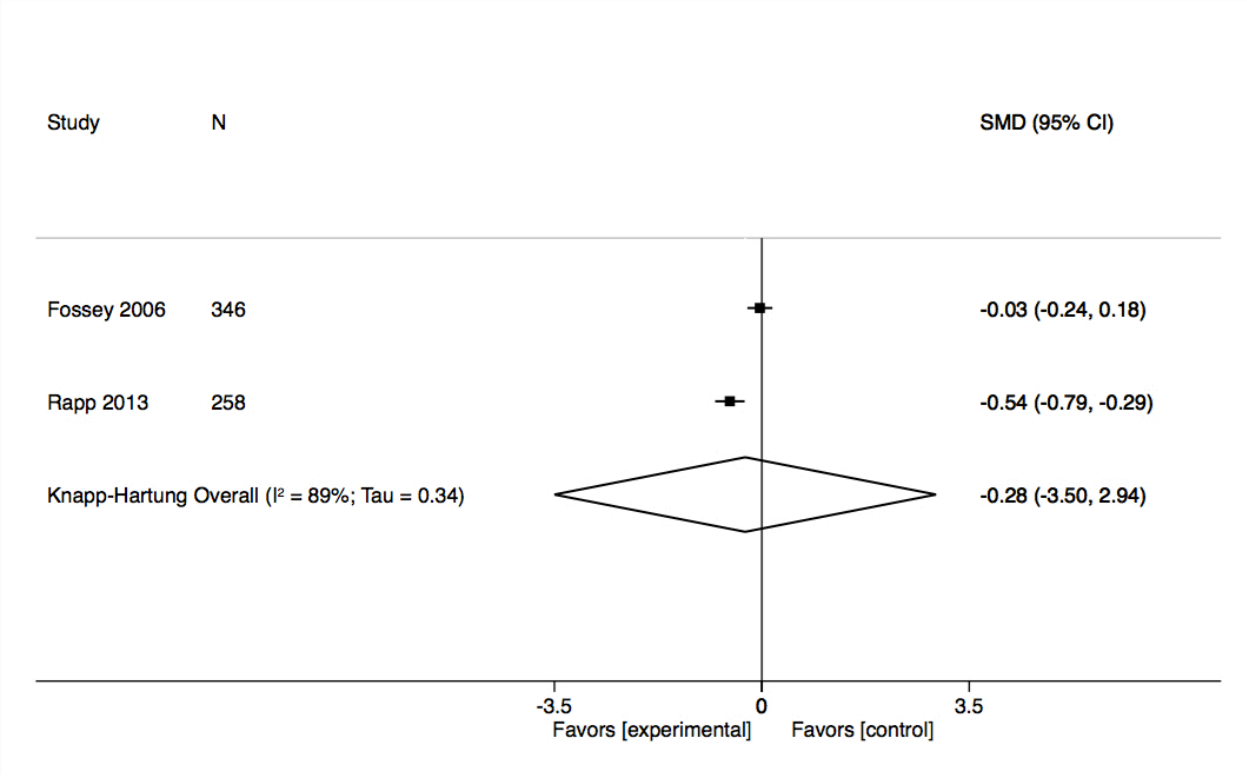


Figure 8: Random effects meta-analysis for the effect of clinical protocols on agitation/aggression

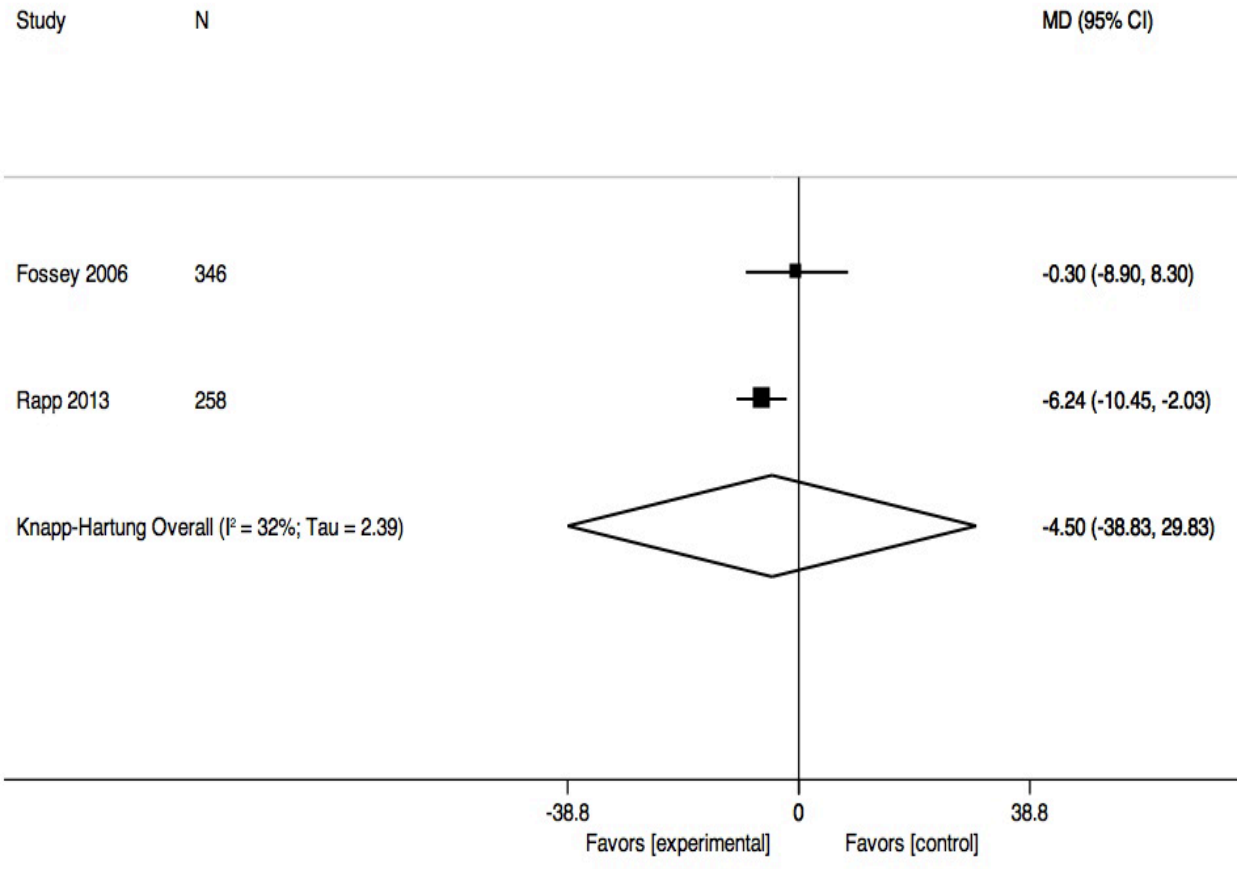
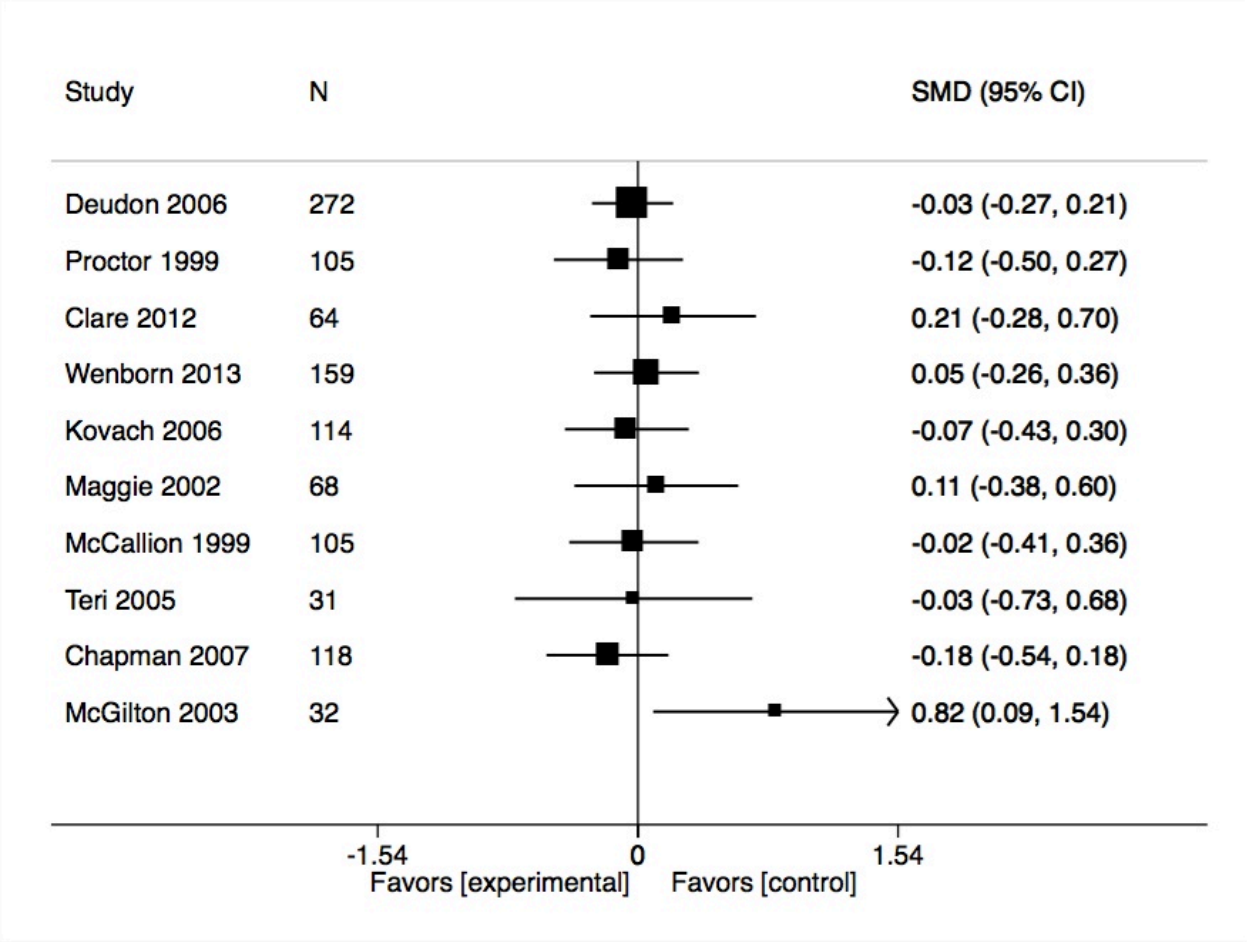


Figure 9: Unique comparisons and effect on agitation/aggression



Patient-Level Interventions for Community-Dwelling Individuals With Dementia

Key Points

- We identified few trials studying patient-level interventions in community-dwelling dementia patients.

Overview

We identified three trials that examined patient-focused interventions for managing agitation/aggression in community-dwelling individuals with dementia.[36,106,107] Two of these were assessed as having high risk of bias and were not included in the analysis[106,107] (Appendix D). Table 9 summarizes the results of these groups and Table 10 lists results for relevant outcomes.

Multisensory Stimulation

Eligible Trial

The remaining study, Baker et al., randomized 50 community-dwelling individuals with dementia to a multisensory stimulation intervention (n = 25) or an active control group (n = 25).[36] The mean age of patients was 78 years and 50 percent were female. Participants had moderate to severe cognitive impairment with a majority diagnosed with Alzheimer's disease (66 percent) followed by vascular dementia (14 percent) or a mixed diagnosis (20 percent). The intervention group received eight standardized 30-minute multisensory stimulation sessions twice weekly for 4 weeks. The multisensory stimulation sessions included unpatterned stimuli, efforts to stimulate all nontaste senses, nondirective enabling approaches by staff, and no intellectual demand of the patient. The active control received eight standardized 30-minute sessions composed of activities typically used with individuals with dementia (such as….) and geared to the individual's interests twice weekly for 4 weeks. Five different scales assessed primary outcomes (patient agitation/ aggression measured with the REHAB deviant behavior subscale and the BRS Social Disturbance subscale, general behavior measured using the REHAB general behavior subscale, the Behavior and Mood Disturbance Scale, and the Behavioral Rating Scale) at baseline, 2 weeks, 4 weeks, and 1 month after sessions were completed. Change from baseline was similar with multisensory stimulation or activities in agitation/aggression and general behavior outcomes once differences in baseline characteristics were taken into consideration. No intermediate or secondary outcomes were reported.

Evidence Synthesis and Strength of Evidence

One small study provides insufficient evidence on the effectiveness of patient-level multisensory stimulation intervention for treatment of agitation/aggression in community-dwelling individuals with moderate to severe dementia for all outcomes.

Table 9. Patient-level interventions for agitation/aggression in community-dwelling individuals with dementia

Intervention-Comparison	Total Number of Studies (Number of participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Multisensory vs. activity	1 (50)	Insufficient – no conclusions drawn
General Behavior		
Multisensory vs. activity	1 (50)	Insufficient – no conclusions drawn

Table 10. Efficacy and comparative effectiveness of interventions delivered directly to caregivers of community-dwelling individuals with dementia

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Baker 2001[36]		***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **REHAB deviant behavior** AMD (CI)[c]: -.32 (-.55 to -.09) **BRS social disturbance** AMD (CI)[c]: -.32 (-.55 to -.09) ***General Behavior*** **REHAB general behavior** MD (CI): ND **BMD** MD in MC: ND ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden:*** NR ***Caregiver Distress:*** NR ***Caregiver QoL:*** NR

BMD=Behavior and Mood Disturbance; BRSD=Behavior Rating Scale for Dementia; NR=Not reported ;REHAB=Rehabilitation Evaluation Hall and Baker;.

Caregiver-Level Interventions for Community-Dwelling Individuals with Dementia

Key Points

- Evidence was insufficient to conclude whether tailored caregiver education and training combined with psychosocial interventions improved agitation/aggression in community-dwelling individuals with dementia.
- Low strength evidence shows that tailored caregiver education and training combined with psychosocial interventions did not improve general behavior in community-dwelling individuals with dementia.
- Low strength evidence shows that tailored caregiver education and training combined with psychosocial interventions improved confidence/mastery in managing individuals with dementia.
- Low strength evidence shows that tailored caregiver education and training combined with psychosocial interventions improves caregiver burden.
- Insufficient evidence for other intervention types and outcomes (patient distress or quality of life, admission to nursing home, and antipsychotic drug use).

Overview

Twenty references reporting on 19 unique RCTs studied caregiver training interventions for managing agitation/aggression in community-dwelling individuals with dementia.[105,108-126] Seven of these publications reported comparisons and outcomes that were assessed as having a high risk of bias (Appendix E).[109,110,116,120,126-128] These studies were not used in our qualitative analysis; they are described in Appendix E. This results in 13 references of 13 unique trials with an acceptable risk of bias to use in analysis. We grouped trials into three groups: 1) standard education and training in which all participants received the same curriculum, 2) tailored education and training based on assessments of behaviors and/or triggers for those behaviors in the person with dementia, and 3) tailored education and training combined with caregiver psychosocial support (e.g., counseling, social support, cognitive reframing, stress management). We conducted a qualitative analysis because study interventions and outcomes were heterogeneous and pooling was not appropriate. Table 11 summarizes the results of these groups and Table 12 lists results for relevant outcomes.

Standard Caregiver Education and Training

Eligible Trial

One eligible study evaluated interventions primarily aimed at educating caregivers about dementia and how to address common situations. For caregivers, mean age was 65.5 years and 68.2 percent were female. For care recipients, mean age was 74.8 years, 54.7 percent were female, and 85.8 percent were white. Teri et al. randomized 148 caregiver and care recipient dyads to a behavior management group (n = 41), an antipsychotic treatment group with haloperidol (n = 34), a trazodone group (n = 37), and a placebo group (n = 36).[123] The only treatment arms relevant to our KQ were behavior management and haloperidol. The behavior management intervention consisted of 11 therapist-led sessions (8 weekly and 3 biweekly) over 16 weeks. The sessions provided information about Alzheimer's disease, strategies for

decreasing agitation/aggression, structured assignments, and videotape training. Treatment began with 0.5 mg per day and was increased at the next visit by 0.5 mg per day unless the subject had at least moderately improved behavior, significant adverse events were noted, or the maximum dose was reached (3 mg/day). Assessments occurred at baseline, 9 weeks (midpoint of intervention period), 16 weeks (conclusion of treatment), and 3 months, 6 months, and 12 months post treatment. Agitation/aggression was measured with three different instruments: a dichotomous variable measuring improvement based on change in Alzheimer's Disease Cooperative Study-Clinical Global Impression of Change (ADCS-CGIC); continuous variables based upon scores on the ABID frequency scale, and the CMAI. General behavior was measured with the BRSD. Changes from baseline were similar between the behavior management and haloperidol treatment groups for each of these instruments. No intermediate outcomes were reported. Changes in caregiver burden, measured with the Screen for Caregiver Burden (SCB), and changes in caregiver distress, as measured with the ABID reaction scale, also were similar in these two treatment groups.[123] Harms comparison is important for this study because one arm is an antipsychotic. Behavior management had statistically significantly fewer symptoms of parkinsonian gait and bradykinesia (0 percent and 0 percent, respectively) compared with haloperidol (22 percent and 33 percent, respectively). There were no differences between groups for the following adverse effects: drooling, dry mouth, dizziness, akathisia, rigidity, dyskinesia, drowsiness, tremor, and fatigue.

Evidence Synthesis and Strength of Evidence

This trial provided insufficient evidence to conclude comparative effectiveness on caregiver behavioral management versus haloperidol in treating agitation/aggression in community-dwelling individuals with dementia.

Tailored Caregiver Education and Training without Caregiver Psychosocial Support

Eligible Trials

Two small trials evaluated interventions that sought to train caregivers based on an assessment of the patient and caregiver without specific caregiver psychosocial components.[117,129] The mean caregiver age was different in the two studies with a mean caregiver age of 50 in one study to nearly 70 in the other. The percentage of caregivers that were female was also different between the two studies with 85 percent being female in one study and just over 60 percent in the other. Recipient characteristics were similar with mean age near 80 and a majority of care recipients female. One trial was conducted in the United States[117] and the other in Peru.[129]

Guerra et al. randomized 58 caregiver and care recipient dyads to an intervention group (n = 29) and a wait-list control group (n = 29).[129] The mean age of caregivers was 50.5 years and 85 percent were female. The mean age of care recipients was 81.9 years and 74.2 percent were female. The intervention used the Helping Carers to Care model, designed for use in diverse low- and middle-income countries. The intervention was delivered by 'junior' psychologists and social workers. It is unclear what 'junior' means in this perspective. Three modules were delivered through five 30-minute weekly sessions that included assessment, basic education about dementia, and tailored training for identified problem behaviors. The wait-list control group received the intervention after 6 months. Followup assessments occurred after 6 months. Patient agitation/aggression was not specifically measured; general behavior was measured using

NPI-Q severity scores. Patient quality of life was measured with the DEMQOL. Adjusted standardized mean changes for both outcomes were similar between intervention and control groups. Intervention and control groups also showed similar postintervention changes in secondary outcomes of caregiver burden, distress, and quality of life as measured by the Zarit Burden Scale, the NPI-Q caregiver distress score, and the WHOQOL-BREF, respectively.

Gormley et al. randomized 62 caregiver and care recipient dyads to a behavioral management program (n = 34) or a control group (n = 28).[117] The intervention group received four sessions of behavior management training over 8 weeks. The mean age of caregivers was 68 years and 60 percent were female. The mean age of care recipients was 76 years and 53 percent were female. Caregivers were trained to identify precipitating factors for aggressive behaviors and subsequent sessions focused on tailored behavioral interventions and modifications. The control group received an equivalent number of sessions, consisting of discussions with caregivers and care recipients on care-related issues and recommendations for community resources. Our primary outcome of agitation/aggression measured with the Rating Scale for Aggressive Behavior in the Elderly (RAGE) and general behavior measured with BEHAV-AD were similar postintervention with intervention or control. The proportion of patients taking antipsychotic drugs postintervention was also similar with intervention and control. Caregiver burden measured using the Zarit Burden Interview was also similar with intervention and control.

Evidence Synthesis and Strength of Evidence

Two small trials compared tailored education and training with waitlist or attention control in a total of 118 patient caregiver dyads. Effects on intermediate, primary, and secondary outcomes were similar for intervention and control. However, given methodological limitations and lack of precision for all outcomes, this evidence is insufficient to assess differences.

Tailored Caregiver Education and Training with Caregiver Psychosocial Support

Eligible Trials

Ten eligible studies evaluated interventions that provided education and training based on an assessment combined with a psychosocial intervention for caregivers.[108,111,112,114,115,118,119,122,124,130] Sample size ranged from 42 to 518. Mean age of caregivers was similar across studies ranging from 62 to 71. The majority of caregivers were female ranging from 64 percent to 90 percent across the 10 studies. Care recipient ages were similar as well, ranging from 75 to 82. Slightly more care recipients were female, ranging from 43 percent to 71 percent female across studies. Interventions varied in the number of sessions, intervention duration, specific psychosocial components included, and the type of healthcare professional delivering the intervention.

Gitlin et al. randomized 237 caregiver and care recipient dyads in their Care of Persons with Dementia in their Environments (COPE) trial.[114] The mean age of caregivers was 62.2 years, 89 percent were female, 69.9 percent were white, and 27.8 were African American. The mean age of the care recipients was 82.4 years, 68.4 percent were female, 70.3 percent were white, and 27.3 percent were African American. The staff used scripts to ask caregivers about challenges, mailed informational brochures, and reviewed materials in subsequent calls to the caregivers. The intervention consisted of up to 10 sessions with an occupational therapist, one face-to-face session with an advance practice nurse, and one telephone session with an advanced practice

nurse over 4 months. Each caregiver was exposed to all of the components of the intervention, including: assessments, caregiver education, and caregiver training to address caregiver-identified concerns and help them reduce stress. Tailored training was given to all caregivers in problem-solving, communication, engaging patients in activities, and simplifying tasks, based on their concerns and patient capabilities. The control group (n = 107 for analysis) received up to three 20-minute telephone calls from trained research staff over 4 months.

Postintervention primary outcomes of patient agitation/aggression (ABID scores) and patient quality of life (QoL-AD) in intervention and control groups were similar. Caregivers in the intervention group were more confident using activities to manage behaviors measured with an investigator-developed Likert scale with five questions (adjusted mean difference 0.81; 95% CI, 0.30-1.32; Cohen *d*=0.54). Effect size was moderate according to Cohen's *d;* scores declined from baseline by 1 percent in the control group and improved by 14 percent in the intervention group.[114] The secondary outcome of caregiver burden measured using the perceived change in well-being improved more in the intervention group (15% vs. 4%; adjusted mean difference 0.22; 95% CI, 0.08-0.36; Cohen *d*=0.30). This between-group difference represented a small effect size according to Cohen *d*.

Gitlin et al. in their Advancing Caregiver Training (ACT) trial, randomized 272 caregiver and care recipient dyads to an intervention group (n = 137) and a no treatment control group (n = 135).[115] The mean age of caregivers was 66 years, 82 percent were female, and 69 percent were white. The mean age of care recipients was 82 years, 53 percent were female, and 69 percent were white. The experimental group, ACT, received up to 11 home and telephone contacts by health professionals over 16 weeks, including up to nine occupational therapy sessions and two nursing sessions. Caregivers identified behaviors most upsetting to them. Health professionals then identified communication and environmental triggers of patient behaviors along with undiagnosed patient health conditions (through blood and urine samples). Health professionals then trained caregivers in strategies to modify triggers and reduce patient upset. Three telephone contacts to reinforce strategy use occurred between 16 and 24 weeks. Control participants were offered a 2-hour in-home education and problem behavior management workshop after the 24-week followup. The 4-month analysis included 117 dyads in the intervention group and 122 dyads in the control group. The 6-month analysis included 106 dyads in the intervention group and 114 dyads in the control group. Caregivers selected a wide variety of behaviors to target during the intervention. Frequently mentioned targeted behaviors included refusing care (15 percent), repetitive questioning (11 percent), argumentation (8 percent), waking up at night (8 percent), toileting problems (8 percent), verbal aggression (8 percent), wandering (7 percent), inappropriate behavior (i.e., loud, destructive) (6 percent), upset or agitation (5 percent), safety concerns (5 percent), and delusions (5 percent).[115]

We classified reported behavior outcomes as general behavioral outcomes since all targeted behaviors were not agitation/aggression. Caregivers in the intervention group were more likely to report that the primary targeted problem behavior improved than were caregivers in the control group (67.5% vs. 45.8%; χ^2=8.7; p=.002).The percentage of caregivers who reported that symptoms worsened (18.4% vs.31.7%; p>.05) or stayed the same (14.0% vs. 22.5%; p>.05) was similar in intervention and control groups. The intermediate outcome, confidence managing target problem behavior as measured by an investigator-developed Likert scale, improved more with intervention than control (20% vs. 10%; adjusted mean difference 0.33, 95% CI, 0.08-0.58; Cohen's *d*=.30). The effect size was small according to Cohen's *d*.[115]

Intervention participants reported significantly higher confidence managing behaviors at 24 weeks on an investigator-developed postintervention questionnaire to ascertain perceived benefits ([unadjusted] 71.9% vs 29.1%; χ^2=41.1; p=.001). Secondary outcomes were reported at postintervention (16 weeks) and at followup (24 weeks).[115] Caregiver burden as measured by the Zarit Burden Interview was similar between groups at 16 weeks, but had significantly improved with a moderate effect size with intervention at 24 weeks (adjusted mean difference -1.61; 95% CI, -3.13 to -0.09; *d*=.67). The effect size was moderate according to Cohen's *d*; mean scores in the intervention group were over 10 percent higher than in the control group at 24 weeks. Caregiver behavior upset overall improved more with intervention than control at both time points (adjusted mean difference -1.07; 95% CI, -1.57 to -0.56; Cohen's d=.47 at 16 weeks; and -0.82; 95% CI, -1.34 to -0.29; Cohen's d=.43 at 24 weeks). Effect size was moderate according to Cohen's *d*; mean scores in the intervention group were over 15 percent higher than in the control group at both time points. Perceived change in caregiver wellbeing improved with intervention compared with control at both time points (adjusted mean difference 0.45; 95% CI, 0.29 to 0.62; Cohen's d=.62 at 16 weeks; and 0.29; 95% CI, 0.14 to 0.44; Cohen's d=.43 at 24 weeks). Effect sizes were moderate according to Cohen's *d*; mean scores in the intervention group were over 10 percent higher than in the control group at both time points.

In another trial, Gitlin et al. randomly assigned 60 caregiver and care recipient dyads to the Tailored Activity Program (TAP) (n = 30) or a wait-list control (n = 30).[112] The mean age of caregivers was 65.4 years and 88.3 percent were female. Caregivers were primarily white (76.7 percent). The mean age of care recipients was 79.4 years and 43.3 percent were female. TAP dyads received six 90-minute home visits and two 15-minute telephone contacts by occupational therapists over 4 months. Care recipient interests were ascertained and individual programs were presented to the caregiver at the next visits, including activities, goals, and implementation plans. Caregivers were instructed to use deep breathing techniques to manage stress. Wait-list controls received the intervention after the 4-month assessment and do not appear to be analyzed as part of the study. Fifty-six dyads were included in the analysis. The primary outcome of patient agitation/aggression was measured using an investigator-created checklist documenting the occurrence of 24 behaviors (16 from the Agitated Behaviors in Dementia Scale; two from the Revised Memory and Behavior Problem Checklist [repetitive questioning/hoarding]; four from previous research [wandering, incontinent incidents, shadowing, boredom], and two others defined by each caregiver). The caregiver completed checklists were used to create two indices, number of behaviors occurring and the mean frequency of occurrence. All behaviors appear to be weighted equally. We classified this outcome as patient agitation/aggression because over half of the questions were from an agitation/aggression scale.

Behavioral occurrences decreased more with the intervention than the control (adjusted mean effect -0.32 points; 95% CI, -0.55-0.09, Cohen's *d*=0.72). Changes in the number of behaviors reported was similar with intervention and control. A binary analysis of specifically agitated behaviors showed a larger reduction in the intervention group compared with the control group (adjusted mean effect 0.6; 95%; CI, 0.01-0.56, Cohen's *d*=0.75). The effect size was moderate according to Cohen *d*. Three intermediate outcomes measured using 5-item Likert scales improved more with intervention than control. Caregiver mastery improved more with intervention (adjusted mean difference 0.34; 95% CI, 0.08 to 0.60; Cohen's d=.55). Effect size was moderate according to Cohen *d;* mean score improved by nearly 10 percent with intervention but stayed the same with control. Confidence using activities improved more with intervention (adjusted mean difference 1.67; 95% CI, 0.41 to 2.94; Cohen's d=.74). Effect size

was moderate according to Cohen *d;* mean score improved by nearly 40 percent with intervention, but only 3 percent with control. Strategy use improved more with intervention (adjusted mean difference 0.25; 95% CI, 0.04 to 0.46; Cohen's d=.71). Effect size was moderate according to Cohen *d;* mean score improved by less than 6 percent with intervention and 4 percent with control. Reductions in secondary outcomes of caregiver burden measured with the Zarit Burden Scale and caregiver behavior upset measured on a Likert scale were similar with intervention and control.

Ulstein et al. randomized 180 caregiver and care recipient dyads to a tailored education and training program with caregiver psychosocial components (n = 90) or a control group (n = 90).[124] The mean age of caregivers was 64.8 years and 63.7 percent were female. The mean age of care recipients was 75.6 years and 56.1 percent were female. The intervention took place over 4.5 months and included a 3-hour physician-led education session that included information about the course of dementia and different treatment options. The intervention also included six 2-hour group meetings focused on communication techniques, problem-solving, and cognitive techniques. Control dyads received usual care. Outcomes were assessed postintervention and at followup (12 months). One primary outcome was reported. General behavior was measured using the NPI-S. Mean change from baseline was similar with intervention and control at both time points. No intermediate outcomes were reported. One secondary outcome, caregiver burden, was measured using the Relatives' Stress Scale (RSS). Mean changes were similar with intervention and control at both time points.

Belle et al., in their Resources for Enhancing Alzheimer's Caregiver Health (REACH) II trial, randomly assigned 642 caregiver and care recipient dyads to a multicomponent intervention (n=323) or an occasional contact control (n=319).[108] The mean age of the caregivers included in the final analysis was 60.6 years and 85.3 percent were female. Of those caregivers included in the final analysis, 32 percent were Hispanic or Latino, 37 percent were white/Caucasian, and 32 percent were black/African American. The multicomponent intervention consisted of education and training to address problem behaviors as well as caregiver psychosocial support to address depression, burden, and self-care/healthy behaviors through 12 in-home or telephone sessions delivered over a 6-month period. Assessments occurred at baseline and 6 months. Results were reported by racial/ethnic group; overall results were not reported. Two primary outcomes were reported. Patient general behavior was measured using three questions from the Revised Memory and Behavior Problem Checklist (covering domains of memory, depression, and disruption). We classified this outcome as general behavior because it did not primarily focus on patient agitation/aggression. No intermediate outcomes were reported. The secondary outcome of caregiver burden was measured using 11 of the 12 items on the brief Zarit Caregiver Burden Interview. The frequencies reported on the checklist and scores from the Zarit Caregiver Burden Interview were used to calculate the number of dyads making clinically significant changes (defined as an unadjusted standardized change of +/- 0.5 standard deviation or more from baseline to followup).

In the Hispanic/Latino subgroup, intervention caregivers were more likely than control caregivers to report that problem behaviors decreased (45% vs. 23%) and less likely to report that they worsened (13% vs. 28%). With a net of 36 percent (95% CI, 13.2 to 56.7) more intervention caregivers reporting a clinically significant improvement compared with the control caregivers. Hispanic/Latino caregivers in the intervention and control groups reported admission of care recipient to nursing home at similar rates. Hispanic/Latino intervention and control caregivers reported similar change in burden postintervention. White/Caucasian intervention and

control caregivers reported similar changes in problem behaviors, admission of care recipient to nursing home, and caregiver burden. Black/African American intervention and control caregivers reported similar changes in problem behaviors and admission of care recipient to nursing home, but the intervention was associated with greater improvement in burden. Net burden was decreased in 23 percent more in the intervention caregivers than control caregivers.

Mittelman et al. randomized 406 caregiver and care recipient dyads to a caregiver intervention (n = 203) or control (n = 203).[119] The mean age of caregivers was 71.3 years, 60.1 percent were female, and 90.9 percent were white. The caregiver intervention included two individual and four family counseling sessions over the course of 4 months. The counseling sessions were tailored, but focused on communication, problem solving, and management of patient behavior, caregiver support, and education and resources related to Alzheimer's disease. Each session was 1 to 3 hours long. After 4 months, caregivers in the treatment group were required to join weekly support groups. Counselors were continuously available for caregivers and families to deal with various problems. The control subjects received usual care. Followup occurred every 4 months for the first year and every 6 months thereafter for 4 years after the start of the study. This publication reports our primary outcome of patient agitation/aggression measured with the Memory and Behavior Problems Checklist. Data on problem behavior frequency and reaction were analyzed with a mixed model growth curve. Memory and Behavior Problem Checklist frequency was similar in intervention and control groups as indicated by the nonsignificance of the group variable and the group-time interaction in the model. Our secondary outcome of caregiver distress measured with the Memory and Behavior Problem Checklist reaction questionnaire improved with intervention group when compared with control as indicated by negative estimates and significance of the intervention variable (estimate -2.90; SE=1.27; p=.0226) and an intervention-time interaction (-1.86; SE=0.89; p=.04). The effect sizes are small and may not be clinically meaningful given the score range of 0–96 for this instrument.

Gitlin et al. in their REACH trial, randomized 255 caregiver and care recipient dyads to an Environmental Skill-Building Program (ESP) and a usual-care control group.[130] The mean age of caregivers was 60.5 years, 76.3 percent were female, 44.7 percent were white, and 52.6 percent were African American. The mean age of care recipients was 80.9 years and 67.9 percent were female. The ESP intervention included five 90-minute home visits and one 30-minute telephone contact over 6 months with an occupational therapist, developing a tailored plan after a needs assessment at the first home visit with the caregiver. The tailored plans could address or recommend environmental factors, education, and community resources. Caregivers were given a form outlining the tailored strategies. In future visits, the dementia education was reinforced, caregivers were observed using previously discussed strategies, strategies were further refined, and new recommendations were given regarding cognitive restructuring and validation. The 6-month analysis included 190 caregivers (89 in the experimental group and 101 in the usual care control group). The primary outcome of patient general behavior measured with the RMBPC frequency scale was similar in intervention and control groups. Intermediate outcomes of mastery managing behaviors measured with the Caregiving Mastery Index and ability to manage caregiving as measured by the Perceived Change Index were similar between groups. The groups did not differ in caregiver distress measured RMBPC reaction to disruptive behaviors scale.

Gerdner et al. randomly assigned 241 caregiver and care recipient dyads, of which 237 were included in the analysis.[111] The mean age of caregivers in the final analysis was 64.8 years and 74 percent were women. Caregivers were primarily white (94 percent). The mean age of care recipients was 76.6 years. The intervention group (n = 132) received individualized

care plans that may have included structured routines and rest periods, environmental modifications, and care recipients' past interests in activities. Care plan information was communicated in person, environmental techniques were taught to the caregivers, and care plan information was provided in a written format. The intervention group participants received 4 hours of contact over two in-home visits 1 week apart. The comparison group (n = 105) received general information about Alzheimer's disease, community resources, a caregiver book, and other brochures. The comparison group participants received two 1-hour in-home visits scheduled 2 weeks apart. Comparison group participants were offered the intervention after study completion. Assessments occurred at baseline, 3 months, 6 months, and 12 months. One primary outcome, general behavior, was measured using the Memory and Behavior problems checklist frequency and analyzed based upon relationship with care recipient using a hierarchical linear model; no overall results were provided. Behavior problems increased significantly as reported by nonspouse caregivers in the comparison group (hierarchical linear model estimate 0.77; SE=0.36; p<.001) relative to the intervention group. Behavior problems were similar between spouse caregivers in intervention and control groups. No intermediate outcomes were reported. One secondary outcome, caregiver distress, was measured with the Memory and Behavior problems checklist reaction and analyzed using a hierarchical linear model without separating estimates by relationship. Caregivers in the intervention group decreased reactions to problem behaviors compared with those in the comparison group (hierarchical linear model estimate -0.39; SE 0.18; p<.01). Effect sizes for both of these outcomes is likely small given the 0 to 96 range on the instruments.

Marriott et al. randomized 42 caregiver and care recipient dyads to three groups: a family intervention group (n = 14), an interview control group (n = 14), and a no-interview control group (n = 14).[118] The mean age of caregivers was 63.6 years and 69.0 percent were female. The mean age of care recipients was 76.9 years and 71.4 percent were female. The family intervention consisted of caregiver education (three sessions), stress management (six sessions), and coping skills training (five sessions) over a total of 14 sessions delivered biweekly. Caregivers in the family intervention also received the Camberwell Family Interview (CFI), booklets about Alzheimer's disease, and booklets listing available services. The interview control group received the CFI, taking approximately 90 minutes, and the assessments. The no-interview control group received only the assessments. Assessments were conducted at baseline, postintervention, and at 3 months followup. We used behavioral disturbance from the MOUSE-PAD as the primary outcome of patient general behavior. Mean scores appeared similar across groups at each time point. The study reported a significant difference between the intervention group and the no-interview control but not the interview control group postintervention. No group differences were seen at followup. No intermediate or secondary outcomes were reported.

In their Minnesota Family Workshop (MFW) trial, Ostwald et al. randomized 117 caregiver and care recipient dyads to an intervention group (n = 72) and a wait list control group (n = 45).[122] A high percentage of the caregivers were female (65.0 percent) while a little more than half of the care recipients were male (51.4 percent). The mean age of caregivers was 65.6 years and the mean age of care recipients was 77.1 years. The intervention group received seven weekly 2-hour training sessions in a classroom format, including homework and readings. The first four sessions included general education and videos about dementia and its impacts on others. The fifth session included videos of the participants being assessed with the Cognitive Performance Test, the results of which were given to participants. The final two sessions included skill development and mastery. Care recipients were invited to a daycare-like setting

with activities tailored to their functional level. The wait list control group received the intervention after 5 to 6 months. Followup assessments occurred at 3 months and 5 months after baseline. Patient general behavior was measured using Revised Memory Behaviors Checklist, disruptive behaviors subscale.[122] Mean scores were similar with intervention and control at both postintervention time points. No intermediate outcomes were measured. Two secondary outcomes were reported. Caregiver burden as measured by the Zarit Burden Inventory did not differ between the groups, but there was a significant intervention by time interaction (F [2, 156] = 5.53, p=0.005). Caregiver distress measured by the RMBPC response to disruptive behaviors was similar in both groups at both time points with a significant intervention by time interaction (F [2, 164] = 4.60, p=0.01).

Evidence Synthesis and Strength of Evidence

Two of the ten trials specifically measured patient agitation/aggression outcomes using different instruments. One found significant moderately sized intervention effects and the other found similar effects across groups. Strength of evidence assessment for this outcome relies on two Gitlin studies with inconsistent results.[112,114] We find insufficient evidence on the effectiveness of tailored education and training with psychosocial support in managing agitation/aggression in community dwelling individuals with dementia.

The evidence for the efficacy of these interventions on general behaviors was mixed within and among the six studies reporting general behavior outcomes. These general behavior outcomes are indirect measures of agitation/aggression. The indirectness and inconsistency across studies provides insufficient evidence to assess whether these intervention have an effect on general patient behaviors.

Only one study reported patient quality of life.[114] We therefore found insufficient evidence to conclude whether caregiver education and training combined with caregiver psychosocial support improves patient quality of life.

Ten trials assessed the effects of a wide range of interventions involving caregiver education and training combined with caregiver psychosocial support.[108,111-115,118,119,122,124] None reported neuroleptic drug use. Four trials reported intermediate outcomes related to changes in caregiver behavior, most often mastery or confidence in using activities to manage behavioral symptoms.[112-115] All of these publications had the same first author. Three of the four studies showed a positive intervention effect.[112,114,115] The trial that did not show a significant effect was small and may not have been sufficiently powered to detect small differences.[113] We assessed the strength of evidence as low with the data suggesting that caregiver education and training combined with caregiver psychosocial support improves caregiver confidence in caring for individuals with dementia.

Many studies reported secondary outcomes. Again, results were mixed within and among studies.[108,112-115,119,122,124,131] Additionally, these interventions have a primary focus of educating and training caregivers with psychosocial support an additional component. Therefore, outcomes of caregiver burden, distress, and quality of life are direct in terms for this review because they are linked to the primary outcome of agitation/aggression. Low strength evidence shows that these interventions may have a small effect on improving caregiver burden.

Trials rarely reported adverse effects. The interventions studied have a low risk for adverse effects.

Table 11. Caregiver-level interventions for agitation/aggression in nursing home and assisted living facility residents with dementia

Intervention-Comparison	Total Number of Studies (Number of participants)	Strength of Evidence - Summary of Results
Agitation/Aggression		
Standard Education and Training vs. haloperidol	1 (75)	Insufficient – no conclusions drawn
Tailored Education and Training	1 (75)	Insufficient – no conclusions drawn
Tailored Education and Training with Caregiver Psychosocial Support	2 (265)	Insufficient – no conclusions drawn
General Behavior		
Standard Education and Training vs. haloperidol	1 (75)	Insufficient – no conclusions drawn
Tailored Education and Training	2 (118)	Insufficient – no conclusions drawn
Tailored Education and Training with Caregiver Psychosocial Support	8 (1,896)	Low – general behavior not improved
Intermediate Outcomes		
Standard Education and Training vs. haloperidol Tailored Education and Training	No studies reporting	Insufficient – no conclusions drawn
Tailored Education and Training with Caregiver Psychosocial Support	1 (62)	Insufficient – no conclusions drawn (antipsychotic & psychotropic drug use)
Standard Education and Training vs. haloperidol	4 (694)	Low (caregiver behavior/confidence improved)
Secondary Outcomes		
Standard Education and Training vs. haloperidol	1 (75)	Insufficient – no conclusions drawn (Caregiver distress/burden/QoL)
Tailored Education and Training	2 (118)	Insufficient – no conclusions drawn (Caregiver distress/burden/QoL)
Tailored Education and Training with Caregiver Psychosocial Support	9 (2,119)	Low (caregiver distress/burden/QoL slightly improved)

Table 12. Efficacy and comparative effectiveness of caregiver-level interventions for community-dwelling individuals with dementia

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Caregiver Education and Training - Standard Curriculum				
Teri 2000[105] RCT United States Behavioral Management Training vs. Haloperidol k=1; n=75 Moderate risk of bias (4 months)	- AD information - Strategies for decreasing agitation/aggression, and structured in-/out-of-session assignments [8 weekly & 3 biweekly sessions; MS therapist] - Haloperidol treatment began with 0.5 mg per day and was increased at the next visit by 0.5 mg per day unless the subject had at least moderately improved behavior, significant adverse events were noted, or the maximum dose was reached (3 mg/day)	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **Improved score on ADCS-CGIC** RR(CI)=1.0 [0.7 to 1.4] ***Agitation*** **CMAI** MC(SD): -3.37 (11.45) vs. -7.26 (22.51) ***Agitation*-ABID Frequency** MC(SD): -3.61 (9.88) vs. -6.74 (16.22) ***General Behavior*** **BRSD** MC(SD): -3.56 (12.85) vs. -5.35 (22.41) **RMBPC Total Frequency** -0.08 (0.54) vs. -0.17 (0.65) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Distress*** **ABID Reaction** MC(SD): -2.41 (6.71) vs. -3.27 (9.10) ***Caregiver Burden*-SCB Subjective** MC(SD): -2.95 (7.29) vs. -1.88 (8.89) ***Caregiver Burden*-SCB Objective** MC(SD): -1.23 (3.32) vs. -0.44 (3.22) ***Caregiver QoL:*** NR
Caregiver Tailored Education and Training				
Guerra 2011[129] RCT United States Caregiver intervention vs. waitlist k=1; n=56 Low risk of bias	- Assessment (one session) - Basic education about dementia (two sessions) - Training regarding specific problem behaviors (two sessions). [five weekly 30-minute sessions; delivered by junior psychologists and social workers]	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***Agitation/Aggression*** No agitation instruments used ***General Behavior*** **NPI-Q severity score** ASMD(CI): -0.10 (-0.66 to 0.48) ***Patient Distress, QoL*** ***DEMQOL*** ASMD(CI): 0.32 (-0.84 to 1.48) ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **ZBS** ASMD(CI): -1.02 (-0.53 to 0.51) ***Caregiver Distress*** **NPI-Q carer distress score** ASMD(CI): -0.09 (-0.64 to 0.48) ***Caregiver QoL*** ***WHO-QoL-Bref, Psych*** ASMD (CI): 0.10 (-0.47

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
				to 0.68)
Gormley 2001[117] RCT United States Behavior management of aggression in dementia vs. attention controls k=1; n=62 Moderate risk of bias	- Assessment (patients' aggressive behaviors) - Training to identify precipitating and maintaining factors - Behavioral interventions suggested by behavioral analysis [4 sessions over 8 weeks]	***Caregiver Behavior:*** NR ***Neuroleptic Use*** ***Taking psychotropic drugs*** **Baseline,** n/N (%) 20 (58.8) vs. 16 (57.1) **Postintervention,** n/N (%) 18 (52.9) vs. 17 (60.7) RR: 0.87 (0.56 to 1.35)	***Agitation/Aggression*** ***RAGE, baseline*** mean(SD)=9.2 (3.8) vs. 8.8 (2.9) ***RAGE, postintervention*** mean(SD)=6.9 (3.6) vs. 8.6 (4.5) ***General Behavior*** ***BEHAVE-AD, baseline*** mean(SD)=8.0 (3.7) vs. 8.0 (4.0) ***BEHAVE-AD, postintervention*** mean(SD)=6.5 (2.8) vs. 7.8 (3.4) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **ZBS, *baseline*:** mean(SD)=38.6 (13.9) vs. 39.5 (13.0) **ZBS, *postintervention*** mean(SD)=36 (12.3) vs. 41.2 (12.0)
Caregiver Tailored Education and Training with Psychosocial support for Caregivers				
Gitlin 2010a[114] RCT United States Care of Persons with Dementia in their Environments vs. Attention Control (up to 3 20-minute phone calls with research staff) k=1; n=209 Moderate risk of bias (4 months)	- Assessments (patient deficits and capabilities, medical testing, home environment, caregiver communication, and caregiver-identified concerns) - Caregiver education (patient capabilities, potential effects of medications, pain, constipation, dehydration) - Caregiver training to address caregiver-identified concerns and reduce stress - Training in problem-solving, communication, engaging patients in	***Caregiver Behavior*** **Confidence using activities** AMD (CI)[a]: 0.81 (0.30 to 1.32) ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **ABID** AMD (CI)[a]: -.65 (-3.05 to 1.74) ***Patient QoL-AD*** AMD (CI)[a]: 0.10 (0.00 to 0.20) ***General Behavior:*** NR ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **Perceived change in well-being** AMD (CI)[a]: 0.22 (0.08 to 0.36)

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
	activities, and simplifying tasks [up to 10 sessions over 4 months with occupational therapists and 1 face-to-face session and 1 telephone session with an advance practice nurse]			
Gitlin 2010b[115] RCT United States Care of Persons with Dementia in their Environments vs. Attention Control (up to 3 20-minute phone calls with research staff) k=1; n=239 at 16 weeks; n=220 at 24 weeks Low to moderate risk of bias	- Assessments (communication and environmental factors; undiagnosed medical conditions - Caregiver training in strategies to modify triggers and reduce their upset. - Maintenance phone calls between 16 and 24 weeks, three telephone contacts reinforced strategy use. ACT involved a 16-week active phase of up to nine occupational therapy (OT) sessions and two nursing sessions (one home and one telephone) and a maintenance phase (16–24 weeks) of three brief OT telephone contacts to reinforce strategy use. [9 home sessions with OT, 1 home, and 1 phone nursing sessions over 16 weeks; 3 maintenance phone calls between 16 and 24 weeks by health professional]	***Caregiver Behavior*** **Confidence managing behavior** 16 weeks AMD (CI)[b]: 0.33 (0.08 to 0.58) 24 weeks: 71.9% vs 29.1%; χ^2=41.1; p=.001 ***Neuroleptic Use:*** NR	***General Behavior*** **Improvement in occurrence of targeted behavior**, 16 weeks 67.5% vs. 45.8%; p=.002 **Target symptoms worsened/stayed the same**, 16 weeks 18.4%/14% vs. 31.7%%/22.5%; p>.05 ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **ZBS**, 16 weeks AMD (CI)[b]: -1.37 (-2.75 to 0.01) **ZBS**, 24 weeks AMD (CI)[b]: -1.61 (-3.13 to -0.09) **Behavior upset overall**, 16 weeks AMD (CI)[b]: -1.07 (-1.57 to -0.56) **Behavior upset overall**, 24 weeks AMD (CI)[b]: -0.82 (-1.34 to -0.29) **Caregiver Wellbeing Perceived Change Index,** 16 weeks AMD (CI)[b]: 0.45 (0.29 to 0.62) **Perceived Change Index**, 24 weeks AMD (CI)[b]: 0.29 (0.14 to 0.44)

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Gitlin 2008[112] RCT United States Tailored Activity Program vs. waitlist k=1; n=56 Low risk of bias	- Assessment to identify daily routines, activity interests - One activity prescription based upon assessment with information, role-playing, direct demonstration with patient - Stress management techniques [8 sessions, six home visits (90 minutes each) and two (15 minute) phone sessions; occupational therapists (OT) over 4 months]	***Caregiver Behavior*** **Mastery** AMD (CI)[c]: .34 (.08 to .60) **Confidence using activities** AMD (CI)[c]: 1.67 (.41 to 2.94) **Strategy use** AMD (CI)[c]: 0.25; (0.04 to 0.46) ***Neuroleptic Use:*** NR	***Agitation/Aggression*** **Specific Behaviors-agitated** AMD (CI)[c]: .06 (.01 to .56) **Behavioral Occurrences**[d] AMD (CI)[c]: -.32 (-.55 to -.09) **Number of Behaviors**[d] AMD (CI)[c]: -.98 (-2.67 to .71) ***General Behavior: NR*** ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **ZBS Subjective - Behavior Upset** AMD (CI)[c]: -.01 (-1.21 to 1.18) **ZBS Subjective - Burden** AMD (CI)[c]: .75 (-3.36 to 4.85) ***Caregiver Distress:*** NR ***Caregiver QoL:*** NR
Ulstein 2007[124] RCT United States Caregiver education vs. usual care k=1; n=180 Moderate risk of bias	- Education on symptoms and normal course of dementia; - Pharmacological and non-pharmacological treatment - Training on communication techniques and structured problem-solving - Education regarding how to handle neuropsychiatric symptoms, get more informal and professional assistance and how to foster patient acceptance of help - Cognitive reframing [one 3-hour educational program about dementia delivered by physicians (geriatricians and psychiatrists); 6 120 minute group meetings over 4.5 months]	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** **NPI-S, *4.5 month*:** MD in MC(SD)=0.8 (-3.61 to 5.28) **NPI-S, *12 month*** MD in MC(SD)=-2.2 (-2.65 to 7.06) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **RSS, *4.5 month*:** MD in MC(SD)=-0.1 (-2.50 to 2.32) **RSS, *12 month*** MD in MC(SD)=-1.2 (-4.23 to 1.79) ***Caregiver Distress:*** NR ***Caregiver QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
Belle 2006[108] RCT United States Results reported by race REACH II vs. attention control Hispanic or Latino k=1; n=168 REACH II vs. attention control White k=1; n=182 REACH II vs. attention control Black k=1; n=168 Moderate risk of bias	- Range of strategies tailored to needs (could include information, didactic instruction, role playing, problem solving, skills training, stress management, telephone support groups) [12 sessions (9 1.5 hour in-home sessions and 3 30-minute telephone sessions and 5 telephone support sessions; certified college graduate interventionist]	***Caregiver Behavior*** NR ***Neuroleptic Use*** NR	***General Behavior*** Problem behavior: Change (%) in net improvement (CI): 36.3 (13.2 to 56.7) ***Long term care admission*** RR (95% CI): 0.17 (0.02 to 1.36) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** Change (%) in net improvement (CI): -4.2 (-16.9 to 25.7) ***Caregiver distress:*** NR ***Caregiver QoL:*** NR
	- Range of strategies tailored to needs (could include information, didactic instruction, role playing, problem solving, skills training, stress management, telephone support groups) [12 sessions (9 1.5 hour in-home sessions and 3 30-minute telephone sessions and 5 telephone support sessions; certified college graduate interventionist]	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** Problem behavior: Change (%) in net improvement (CI): 13.6 (-6.3 to 35.3) ***Long term care admission*** RR (95% CI): 0.51 (0.21 to 1.22) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** Change (%) in net improvement (CI): -4.6 (-23.7 to 15.4) ***Caregiver distress:*** NR ***Caregiver QoL:*** NR
	- Range of strategies tailored to needs (could include information, didactic instruction, role playing, problem solving, skills training, stress management, telephone support groups) [12 sessions (9 1.5 hour in-home sessions and 3 30-	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** Problem behavior: Change (%) in net improvement (CI): -3.6 (-25.2 to 16.7) ***Long term care admission*** RR (95% CI): 1.54 (0.45 to 5.31) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** Change (%) in net improvement (CI): 23.1 (0.6 to 45.7) ***Caregiver distress:*** NR ***Caregiver QoL:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
	minute telephone sessions and 5 telephone support sessions; certified college graduate interventionist]			
Mittelman 2004[119] RCT United States Caregiver intervention vs. usual care k=1; n=406 Moderate risk of bias	Individual and family counseling sessions [2 individual, 4 family sessions over 4 months] tailored to needs assessment - Caregiver weekly support groups [beginning in month 5; indefinitely] - Ad hoc counseling [counselors available via phone as needed]	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** MBPC-frequency log growth model: Estimate for group (SE): 0.24 (1.23); p=.84 Estimate for group x time (SE): -0.03 (0.86); p=.96 ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden:*** NR ***Caregiver distress*** MBPC-reaction: Estimate for group (SE): -2.90 (1.27) p=.02 Estimate for group x time (SE): -1.86; (0.89) p=.04 ***Caregiver QoL:*** NR
Gitlin 2003[113] RCT United States Environmental skill-building vs. usual care k=1; n=190 Competence-environmental press framework Moderate risk of bias	- Education about dementia and impact of home environment - Instruction in problem solving and developing effective approaches to manage caregiving concerns that involve manipulating physical/ social environment including cognitive reframing/validation - Implementation of environmental strategies tailored to caregivers context - Generalization of strategies [five 90-minute home visits and one 30-minute phone session; occupational therapist]	***Caregiver Behavior*** **Perceived change in ability to manage caregiving** AMD (CI): .12 (-.05 to .30) Mastery AMD (CI): .11 (-.05 to .27) ***Neuroleptic Use:*** NR	***General Behavior*** **RMPBC no. of disruption-related behaviors** AMD (CI): -.07 (-46 to .33) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden:*** NR ***Caregiver distress*** **Upset with disruptive behaviors (RMPBC subscale)** AMD (CI): -.05 (-19 to .09) ***Caregiver QoL:*** NR
Gerdner 2002[111]	- Individualized care plan	***Caregiver Behavior:*** NR	***General Behavior***	***Caregiver Burden:*** NR

Study **Design** **Country** **Comparison** **k= ; n=** **Study Risk of Bias**	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument*** **Results**	***Primary Outcome-Instrument*** **Results**	***Secondary Outcome-Instrument*** **Results**
PLST training program vs. attention controls k=1; n=237 Moderate risk of bias	(structured routine with environmental modifications, engaging activities, reduced screen time) - Review, education, written summary of care plan [2 sessions; 4 hours total]	***Neuroleptic Use:*** NR	MBPC frequency (hierarchical linear model): Coefficient (SE) Non-spouse experimental: REF Non-spouse comparison: 0.77 (0.36); p<.001 Spouse experimental: 0.18 (0.26) Spouse comparison: 0.18 (0.26) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver distress*** MBPC reaction hierarchical linear model estimate -0.39; SE 0.18; p<.01 ***Caregiver QoL:*** NR
Marriott 2000[118] RCT United States Family intervention vs. attention controls vs. no treatment k=1; n=42 Moderate risk of bias	- Caregiver education (based upon assessment using knowledge about dementia interview; provided general AD information and practical advice on management) - Stress management - Coping skills training [14 biweekly sessions; clinical psychologist]	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** **MOUSE-PAD-Behavioral disturbance** Baseline, mean (SD): 5.1 (2.1) vs. 5.4 (2.5) VS. 5.1 (2.2) Post-treatment, mean (SE): 4.9 (0.2) vs. 5.0 (0.2) vs. 5.6 (0.2) Followup, mean (SD): 5.3 (2.0) vs. 5.5 (2.4) vs. 5.2 (2.0) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden:*** NR ***Caregiver Distress:*** NR ***Caregiver QoL:*** NR
Ostwald 1999[122] RCT United States General stress mediation model Psychoeducational intervention vs. waitlist k=1; n=84 Low to moderate risk of bias	- Education about dementia and how it affects patient, caregivers, family system - Develop and strengthen caregivers' practical skills for dealing with caregiving tasks on a day-to-day basis. - Strengthen caregivers' feelings of confidence and belief that they are able (competent) to deal with issues, day in and day out - Facilitating the family's ability to work collaboratively to find	***Caregiver Behavior:*** NR ***Neuroleptic Use:*** NR	***General Behavior*** **RMBPC, disruptive behavior subscale** Baseline, mean (SD): 6.75 (5.55) vs. 5.32 (4.10) 3-months, mean (SD): 6.16 (5.26) vs. 4.87 (3.54) 5-months, mean (SD): 6.35 (5.20) vs. 6.68 (4.50) ***Patient Distress, QoL:*** NR ***Nursing Home Admission:*** NR ***Injuries:*** NR	***Caregiver Burden*** **ZBS** Baseline, mean (SD): 56.18 (13.29) vs. 56.54 (15.97) 3-months, mean (SD): 56.82 (11.83) vs. 55.43 (15.91) 5-months, mean (SD): 54.13 (11.29) vs. 59.81 (15.23) ***Caregiver distress*** **RMBPC, caregiver response to disruptive behavior subscale** *Baseline, mean (SD):*

Study Design Country Comparison k= ; n= Study Risk of Bias	**Intervention Description [Intensity, Duration, qualifications interventionist]**	***Intermediate Outcome-Instrument* Results**	***Primary Outcome-Instrument* Results**	***Secondary Outcome-Instrument* Results**
	solutions to current management problems [7 120-minute weekly sessions]			*6.76 (6.27) vs. 5.20 (5.10)* *3-months, mean (SD): 5.00 (5.38) vs. 4.42 (4.23)* *5-months, mean (SD): 4.08 (4.44) vs. 5.73 (4.42)* ***Caregiver QoL:*** NR

ABID=Agitated Behavior in Dementia; BEHAVE-AD=Behavioral Pathology in Alzheimer's disease; ADCS-CGIC=Alzheimer's Disease Cooperative Study-Clinical Global Impression of ChangeBMD=Behavior and Mood Disturbance; BRSD=Behavior Rating Scale for Dementia; MBPC=Memory and Behavior Problem Checklist; MOSES=Multi-dimensional Observation Scale for Elderly Patients; NPI=Neuropsychiatric Inventory; REHAB=Rehabilitation Evaluation Hall and Baker; RMBPC=Revised Memory and Behavior Problem Checklist

[a] adjusted for living arrangement (alone vs. with caregiver) and baseline value of dependent variable

[b] adjusted for baseline value, caregiver gender and relationship to patient

[c] analysis adjusted for baseline value, care recipient cognitive status (MMSE) and number of ADL dependencies, caregiver age, gender, education, relationship to the care recipient

[d] Behavioral outcomes included occurrence of each of 24 behaviors (16 from ABDS and 2 from RMBPC and 2 others identified by families). For each behavior, families indicated yes if behavior occurred and how many times. Behaviors reported as constantly occurred were scored 300.

Discussion

Reducing off-label use of antipsychotic drugs for individuals with dementia is a priority. It will require strong evidence that nondrug treatments can effectively reduce agitation/aggression and improve patient quality of life. Evidence is mounting about the risks of drug treatment. Patients who are overmedicated with antipsychotics and robbed of experiencing life due to sedatives experience a clear detriment. For people with dementia, psychoactive medications can cause harm and even death. The Centers for Medicare and Medicaid Services has launched an active campaign to reduce the use of psychoactive medications.[132,133] Even when psychoactive drugs are called for, they must be used sparingly and for a specific documented behavior, and they must also be tapered. Ideally, nonpharmacologic approaches would be substituted as psychoactive medications were reduced, creating a win-win situation. Caregivers who are confident about the efficacy of nonpharmacologic options may be more willing to reduce and forgo medications.

Unfortunately, despite the urgent need for strong evidence, the current literature on nonpharmacologic options is weak. Research on the nonpharmacologic management of aggression in dementia is still a cottage industry. Trials are mostly small and vary widely in instruments used to measure outcomes, analysis techniques, and reporting. Each investigator seems anxious to add something new. We found few substantial clusters of intervention/outcome pairs. Given the heterogeneity in comparisons and outcomes, pooling for meta-analysis was rarely possible. However, we tried to identify patterns within groups of conceptually similar comparisons. Evidence was insufficient to draw conclusions for a large number of comparisons and outcomes. In some cases, low strength evidence showed that interventions were not effective in reducing agitation/aggression. Among patient-focused interventions in nursing home and assisted living settings, music, aromatherapy with lavender, and bright light therapy had similar effects on agitation/aggression as inactive control (placebo, attention controls, usual care). Among interventions implemented at the care-delivery level in nursing home and assisted living settings, dementia care mapping and patient-centered care had similar effects on agitation/aggression as usual care. Low strength evidence showed that tailored caregiver education and training combined with a caregiver psychosocial component was similar to inactive control in managing general behavior in dementia, improved caregiver confidence, and reduced caregiver burden.

Limitations of Available Studies

Our review reflects the limitations of the available literature. We found substantial heterogeneity in interventions and outcomes across trials and methodological problems within trials. While we did identify a large number of trials that tested interventions for improving behavioral symptoms in dementia; fewer specifically measured agitation/aggression. Few groups of studies had sufficient similarity in interventions, comparisons, and outcomes to allow appropriate data pooling. When pooling was not appropriate, we attempted a qualitative synthesis of similar comparisons and outcomes. Despite these attempts, our analysis still consists of several unique comparisons, often from small studies with methodological limitations, resulting in evidence insufficient to draw conclusions about efficacy or comparative effectiveness.

Our primary outcome was agitation/aggression. Several different instruments were used to assess this outcome. Certain instruments are best suited to certain settings and patients. Whether each study selected the most appropriate instrument was unclear, and we found little information regarding changes in these scores associated with a clinically meaningful difference. None of the

studies we analyzed used instrument-specific thresholds to assess efficacy or comparative effectiveness. Additionally, although the CMAI is a very widely used instrument in nursing home and assisted living settings and has been determined valid and reliable, many studies reported only subscales of the CMAI. Whether these subscales are valid or reliable or sensitive to changes occurring in response to treatment is unclear.

Understanding that we may not find studies that reported agitation/aggression, we included studies that assessed behavioral symptoms with more general instruments. These instruments (NPI, MOSES) contain items across a wide variety of behavioral symptoms. Changes in overall scores on these instruments are not straightforward or directly related to agitation/aggression.

We found few references documenting established minimal important differences for any of the instruments used to assess agitation/aggression, general behavior, or intermediate and secondary outcomes. Without an understanding of what constitutes a clinically meaningful change, interpretation of statistically significant differences and assessment of precision was challenging.

Individual studies assessed as having a low or moderate risk of bias still presented several methodological problems. Many trials were underpowered. Underpowered studies that cannot be pooled add little value to the field and should not be conducted. Calculating sample sizes necessary for appropriately powered RCTs should incorporate the high attrition rate commonly found in this population of older adults with health problems. Individuals with dementia change living status and die. Withdrawals and dropouts created considerable loss of participants from already small sample sizes in some studies. Although attrition was predictably high in the studies we reviewed, it was not always adequately described and intention to treat analysis was rarely conducted.

Details regarding the population, setting, and methodology were often inadequately described. Few studies provided details on dementia type or severity/stage of illness.

Current study designs are not well described, which is a common problem in nonpharmacologic research.[134] Control conditions are also poorly described, including the concomitant use of antipsychotic medications. This was especially a problem in older studies. Usual care was rarely described when it was used as a comparison. Often, sample selection and method of randomization were not reported. Few studies described and accounted for simultaneous treatments, especially psychoactive medications. When use of psychoactive medications was reported, trials rarely eliminated their use; at most, medications were held constant during the study and/or medication changes were recorded as an outcome. Outcome assessors were often aware of the intervention status of participants or of the research question, potentially biasing the findings. Many studies used multiple outcomes and analyzed multiple comparisons but most failed to make statistical adjustments for the multiple comparisons.

Moreover, when studies are compared with usual treatment, the usual treatment is rarely defined. People with dementia, especially in group residential settings, are typically exposed to a hodgepodge of activities and therapies designed to improve functioning and quality of life. Indeed, RCTs of one intervention are sometimes used as an attention control for another intervention. Similarly, the physical environments and rules for conduct in the residential settings of the studies are seldom described, yet could have powerful effects on reducing or ameliorating agitation/aggression

Many observers tend to combine aggression and agitation/aggression as an outcome, but these are not synonymous. Although aggression is a form of agitation, it differs from agitation and anxiety in a caregiving context. Agitation/aggression was rarely described other than reports of instrument scores. Further, agitation/aggression was reported in a variety of ways. Some instruments combine them; others separate them. However, when the behaviors are separately

assessed with certain elements of an instrument, we could not always determine whether that instrument is designed to yield valid and reliable subsets of questions. Scales to measure agitation include elements such as restlessness or aimless pacing, repetitive requests and "verbalizations," and so forth. Agitation may be prompted by loss of memory or it may reflect anxiety. If the anxiety is the patient's and not the caregiver's, then its underlying cause must be ascertained (e.g., pain or discomfort or some specific stimulus). Agitated verbal or physical behavior may be annoying and even frustrating to caregivers but is not necessarily a problem requiring treatment. By contrast, verbal and especially physical aggression often do require treatment. At best, aggression may arouse fear or disturb the calm of other patients in group settings; at worst, it may cause injury to caregivers or other patients. Aggression is also likely to harm its perpetrator in the form of increased restrictions or temporary or permanent removal to another setting, resulting in increased confusion. For these reasons, aggression is likely to be treated more assertively than various forms of agitation, but the level of agitation/aggression that practitioners feel compelled to medicate is unclear. Ironically, the epidemiology of agitation/aggression is not well understood, from the distribution of agitated behavior to how often various behaviors occur separately or together in the same patient and whether any discernable progression can be observed.

What, then, constitutes a behavior that requires treatment? Or more specifically, when is behavior problematic enough to justify the use of psychoactive medications? Interventions for agitation/aggression address two basic goals: 1) to prevent or minimize problematic events and 2) to manage such events when they do arise. These two goals imply different strategies. Preventing or minimizing events can rely on environmental manipulation such as music or light, or activities that create a diversion or draw on strengths of remote memories; it may involve individually based approaches to identify triggers for a given person and subsequently avoid them. (This is essentially the basis for dementia care mapping and for the general stance that agitation/aggression is communication that caregivers need to try to decipher and respond to.) Conversely, managing events once they arise may involve distraction, calming behavior by staff, or moving individuals to a calming environment.

Given this distinction, preventive strategies should be enacted over long time periods in order to reduce the frequency and/or intensity of events. Likewise, treatments designed to prevent agitation/aggression should produce long-lasting effects, and thus longer-term followup is appropriate. Some of these treatments require staff to change their approach to dealing with individuals with dementia. Sustaining changes that ensue may require support. Other techniques aim to squash or at least diminish agitation/aggression when they arise. Unlike preventive strategies, reactive strategies are in the moment and need to work immediately; however, their effect will not last beyond the episode. Therefore, the measures of success for preventive and reactive approaches should differ. However, we found substantial confusion in distinguishing strategies and measures.

In the case of agitation, one might question the impetus for treatment. Who is upset by this behavior? To the extent that it reflects underlying physiological or psychological problems, such as pain or distress, agitation cues the need for further investigation. However, if agitation is chronic, might it not be addressed differently? Agitated behavior, although it may prove annoying to other patients, may ultimately present more difficulty for caregivers than for patients. Therefore, one approach to dealing with agitation may be to help caregivers better tolerate it. A serene unit with a minimum of uninterpretable behavior or conversation may not be a desirable goal worthy of medicating patients to achieve. If the target is staff understanding and

acceptance of agitation, then the measure of success would not be decreased frequency of episodes but rather staff interpretation of the episodes.

We might expect to see interventions tested for effectiveness before being used as the basis for training, but such was not the case. Instead, the line between training studies and interventions proved hard to draw. Several interventions required that staff be trained to behave differently, but the training was sparsely described. Some studies used a combination of outside experts and trained staff to implement interventions.

Changing the behavior of caregiving staff is challenging, especially in nursing homes, where training and oversight is modest at best. Nursing home staff are notoriously overworked and generally not eager to take on new tasks, especially ones that require them to radically alter their typical behavior and routines. Although all nursing homes are required to have in-service educators and to conduct training at intervals, staff training tends to be perfunctory and brief with sparse oversight and encouragement. Maintaining a new behavior requires regular feedback to engender a sense that it is working. Staff training is even more difficult when the staffing is unstable or staff feel great pressure to complete assigned tasks. The more complex and judgmental the intervention, the more difficult it is to implement, especially within nursing home hierarchies. In regard to assisted living and other group residential settings and in-home care services, training requirements are even fewer, dependent largely on state rules. Furthermore, the staff in such settings is harder to define. Some studies used external staff to establish the effectiveness of the behavior; the effects of these interventions have short half-lives because implementation disappears with the end of the study. Relying on staff to administer the intervention increases chances of longer-term success, but doing so is far more complicated. As mentioned, staff must then be trained and supervised. Ultimately, the more an intervention depends on staff, the harder it is to separate it from a training study in research.

Many studies used multiple outcome measures; most failed to make statistical adjustments for the multiple outcomes. The large number of measures may reflect uncertainty about the goals of the intervention or the lack of a good measure.

Few studies accounted for or even described simultaneous therapies, especially psychoactive medications. Further, physical environment was rarely addressed (e.g., private or shared rooms, freedom or restrictions of movement, policies for dining, bathing, and care routines that may generate resistance). We found few studies of such environmental and practice shifts (other than the training to generate more effective staff) and the environments for these studies were rarely described. Even studies of bathing interventions did not describe usual routines for bathing. In studies of individualized activities, authors provided little sense of the spaces available for such efforts. Most of the nursing home studies took place in multiple facilities, either with facilities or units randomized or with intervention and control groups in each setting of the study. In these cases we know little about how settings varied. Neither setting is included as a dummy variable, but even if it were, sample size would make facility differences in effects hard to find.

Our findings are consistent with many prior reviews, but more pessimistic than others, which showed benefit for certain interventions. A recent systematic review of music therapy for a broad range of behavioral and psychological symptoms found a small effect for anxiety and behavior (broadly defined).[135] This review included a broader range of symptoms and study designs and did not specifically address agitation/aggression. Another recent review specifically addressing agitation concluded that music therapy following protocol failed to produce a sustained benefit.[136] The same review found no evidence of efficacy for aromatherapy or light therapy.[136] In contrast, Livingston et al. concluded that the available evidence showed that dementia care

mapping and person-centered care showed efficacy.[136] They included a broader range of study designs, failed to conduct a meta-analysis, and may have concluded efficacy when changes from baseline were present in the absence of differences from control group. Brodaty et al. concluded that caregiver interventions improved behavioral outcomes in community-dwelling individuals with dementia.[137] However, this study included a broad range of psychological and behavioral symptoms and the strongest effects were from studies focusing on depression.

In summary, the evidence for nonpharmacologic treatment of agitation/aggression in individuals with dementia is weak and obfuscated by an inconsistent and confusing terminology. A clearer map and more precise terms are needed to outline the variations in the problem and the links between specific interventions and problem elements. Also needed are more consistent measures and clearer rationales for how the measures address treatment goals as well as appropriate timelines. Simultaneous treatments such as psychoactive treatments must be accounted for. Nonetheless, this line of research will continue to be difficult. The incidence of problems is unpredictable and nursing home environments are unstable.

Applicability

Our conclusions are likely relevant to the broad population of individuals with dementia. The populations described appear similar to the overall population with dementia within each setting, at least by age and sex. Nursing home residents and dementia patients are more often female, likely due to their longer life expectancy. When dementia type was described, Alzheimer's disease was typically the most prevalent, consistent with national estimates. While the populations reflect the population of individuals with dementia, it is more challenging to assess the applicability of results of studies conducted in nursing homes and assisted living facilities. These facilities vary greatly in size, environments, and staffing models. Few studies described these characteristics, so applicability is unclear.

Future Research Needs

This review sought to identify and synthesize RCTs testing nonpharmacologic interventions for agitation/aggression in dementia. The evidence is weak and offers no insight about promising practices. The discussion of study limitations above points to many issues that must be addressed in future work. Future research should be thoughtfully planned and rigorously conducted (Table 13). First, several conceptual issues must be addressed. A clearer map of specific types of agitation/aggression and links to specific interventions may prove more valuable than addressing the general dementia population with broadly defined behavioral symptoms. Also needed are more consistent measures and clearer rationales for how the measures address treatment goals as well as appropriate timelines.

A more systematic approach to future research, where variations are tested sequentially and under more defined conditions, could move the field forward. An order of procedure that would be generally clinically acceptable might start with adding a candidate treatment. That approach, if it produced a substantial effect, could then be tested instead of existing drug therapy.

Future RCTs should be adequately powered and power calculations should incorporate the expected high attrition rate when calculating necessary sample sizes. Given that many studies showed little or no effect for most interventions, accumulating more studies with the small sample sizes is unlikely to change the results. Future trials should adequately describe the intervention and control condition, blind outcomes assessors, and use instruments appropriate to

the intervention. They should also appropriately correct for multiple comparisons and account for simultaneous treatments such as psychoactive medications.

Table 13. Future research needs

Key Question	Results of Literature Review	Types of Studies; Needed to Answer Question	Future Research Needs
General Methodological Issues	Underpowered studies	RCTs	Funding/conducting RCTs with power adequate to answer the research question is necessary to avoid underpowered studies. Power calculations should incorporate the expected higher rate of attrition common in this population.
	Few groups of studies with sufficient similarity in interventions, comparisons, and outcomes allowing appropriate data pooling	Consensus conference	It would be beneficial to standardize promising practices and study those practices in RCT studies. It would also be beneficial to develop guidance to assist researchers in selecting the appropriate instruments to measure agitation/aggression.
	No established minimum important differences for commonly used instruments measuring agitation/aggression outcomes.	Survey research	It would be beneficial to conduct studies to determine thresholds for commonly used instruments that indicate clinically meaningful changes. These threshold values could be used in comparative effectiveness research.
KQ 1a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia in long-term care?	Study populations in nursing home settings often likely had a wide variety of agitation/aggression behaviors that might respond differently to specific treatments.	RCTs	Patients with similar symptoms could provide the population for intervention trials
KQ 1b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among individuals with dementia in long-term care settings?	Harms were rarely reported; most interventions were unlikely to have serious harms.	RCTs	It would be beneficial to record and report harms or lack thereof by group.
KQ 2a: What is the comparative effectiveness of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?	Tailored interventions did not demonstrate an effect on behaviors. Few trials specifically targeted agitation/aggression.	RCTs	Patients with similar symptoms could provide the population for intervention trials to determine if certain behavioral symptoms do not respond to nonpharmacologic treatment.
	Caregiver tailored education and training showed benefits to caregivers (improved confidence of managing behaviors). It is unclear if these benefits are maintained after the intervention ends.	RCTs	Long term followup is necessary to determine if caregiver benefits are maintained after intervention ends. Testing could be conducted to determine if booster sessions or long-term psychosocial interventions help maintain

Key Question	Results of Literature Review	Types of Studies; Needed to Answer Question	Future Research Needs
			intervention benefits.
KQ 2b: What are the comparative harms of nonpharmacologic interventions in preventing and responding to agitation/aggression among community-dwelling individuals with dementia?	Harms were rarely reported; most interventions were unlikely to have serious harms.	RCTs	It would be beneficial to record and report harms or lack thereof by group.

Conclusions

Research on nonpharmacologic treatment of agitation/aggression seems to have developed in a rather hodgepodge fashion. Our review found insufficient evidence to draw conclusions regarding most of the interventions that have been studied to address agitation/aggression in individuals with dementia. The few interventions with low strength evidence had null effects. Despite the urgent need for alternatives to drug treatment from problem behaviors, the current state of the literature provides little information useful to changing practice.

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Abbreviations

ABID	Agitated Behavior in Dementia Scale
ABRS	Agitated Behavior Rating Scale
ACT	Advancing Caregiver Training
ADCS-CGIC	Alzheimer's Disease Cooperative Study-Clinical Global Impression of Change
AHRQ	Agency for Healthcare Research and Quality
AICT	Advance Illness Care Teams
ARD	Absolute risk difference
BASE	Balancing Arousal Controls Excesses
BEHAVE-AD	Behavioral Pathology in Alzheimer's disease
BLT	Bright light therapy
BMD	Behaviour and Mood Disturbance
BPSD	Behavioral and Social Symptoms of Dementia
BRS	Behavioral Rating Scale
BRSD	Behavior Rating Scale for Dementia
CENTRAL	Cochrane-Central Register of Controlled Trials
CFI	Camberwell Family Interview
CI	Confidence interval
CMAI	Cohen-Mansfield Agitation Inventory
COPE	Care of Persons with Dementia in their Environments
DCM	Dementia care mapping
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
ESP	Environmental Skill-Building Program
FVEP	Family Visit Education Program
ICTRP	International Controlled Registry Platform
LTC	Long-term care
MBPC	Memory and Behavior Problem Check List
MFW	Minnesota Family Workshop
MOSES	Multi-dimensional Observation Scale for Elderly Patients
NCD	Neurocognitive disorders
NPI	Neuropsychiatric Inventory
NPI-C	Neuropsychiatric Inventory Clinician
PAS	Pittsburgh Agitation Scale
PCC	Person-centered care
PICOTS	Population, Interventions, Comparators, Outcomes, Timing, Setting
RAGE	Rating Scale for Aggressive Behavior in the Elderly
RCT	Randomized controlled trial
REACH	Resources for Enhancing Alzheimer's Caregiver Health
REHAB	Rehabilitation Evaluation Hall and Baker
RMBPC	Revised Memory and Behavior Problem Checklist
RR	Risk ratio
RSS	Relative Stress Scale
SCB	Screen for Caregiver Burden
SMD	Standardized mean difference
TAP	Tailored Activity Program
TREA	Treatment Route for Exploring Agitation
WMD	Weighted mean difference